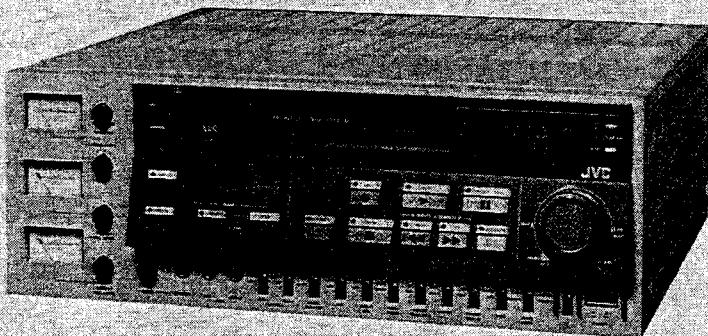


JVC

SERVICE MANUAL

EDITING RECORDER WIS

BR-8600U



SPECIFICATIONS

GENERAL

Format VHS 1/2" (12.7 mm) NTSC standard

Power requirement AC 120 V \sim , 50/60 Hz

Power consumption 68 watts (Max. 80 watts with the Automatic Editing Control Unit, 12 V DC, 550 mA)

Dimensions 44.0(W) x 16.5(H) x 43.0(D) cm (17-1/4" x 6-1/2" x 17") (excluding protrusions)

Weight 18.5 kg (41.0 lbs.)

Operating temperature 5°C to 40°C (41°F to 104°F)

Storage temperature -20°C to 60°C (-4°F to 140°F)

Tape speed 33.35 mm/sec (1.31 inches/sec)

Recording & Playback time Max. 120 min. with JVC T-120

Fast forward/Rewind time Less than 5 min. for 120 min. tape

Wow and flutter Less than 0.25% rms

Search speed Shuttle RWD/REV \pm 10X

Variable 0 \pm 5X, \pm 10X

VIDEO

Recording & Playback system Rotary two-head, helical scanning system

Luminance: FM recording

Color signal: Phase shift, converted subcarrier direct recording

NTSC-type color signal (EIA standard)

Line/TV - 0.5 to 2.0 Vp-p, 75 ohms,

unbalanced

Line/TV - 1.0 Vp-p, 75 ohms, unbalanced

45 dB (Rohde and Schwarz noise meter)

Monochrome: 300 lines, Color: 240 lines

4 +0/-3 Vp-p, 75 ohms, unbalanced

TV/LINE-1/LINE-2

INT/EXT/VIDEO

AUDIO

Input Line

-6/-20 dBs (selectable), 10 k-ohms, unbalanced (CH-1/CH-2)

Mic

-70 to -60 dBm, 600 ohms, unbalanced

Output TV

-20 dBs, 10 k-ohms, unbalanced

Line

-6.0 dBs, low impedance, unbalanced

Monitor

0 dBs, low impedance, unbalanced (CH-1/MIX/CH-2)

Headphone

HIGH/MED/LOW, 8 to 300 ohms, unbalanced

TV

0 dBs, low impedance, unbalanced

Signal-to-noise ratio

48 dB (NR-on), 44 dB (NR-off) (at 3% distortion level)

Frequency response

20 to 12,000 Hz

Input select

TV/LINE 1/LINE 2

Monitor output select

CH-1/MIX/CH-2

CONNECTORS

Video

BNC-type connectors

Line input/output

BNC-type connector

SYNC input

EIAJ 8-pin TV connector

TV input/output

Audio

RCA-type pin jacks

Line input/output

6 mm jacks

Mic

RCA-type pin jack

Monitor out

6 mm jack

Headphone

45-pin connector

Remote control

3-lead AC connector

AC in

Power cord, monitor cable, dust cover

Accessories

Design and specifications subject to change without notice.

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the  symbol and shaded () parts are critical for safety.

Replace only with specified part numbers.

Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Use specified internal wiring. Note especially:

- 1) Wires covered with PVC tubing
- 2) Double insulated wires
- 3) High voltage leads

4. Use specified insulating materials for hazardous live parts. Note especially:

- 1) Insulation Tape
- 2) PVC tubing
- 3) Spacers
- 4) Insulation sheets for transistors

5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

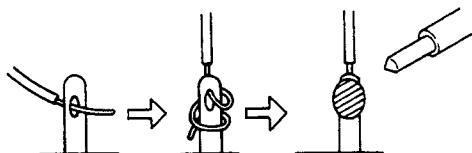


Fig. 1

6. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

7. Check that replaced wires do not contact sharp edged or pointed parts.

8. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

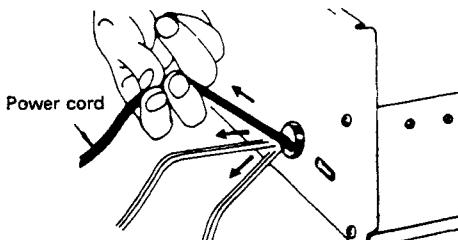


Fig. 2

9. Also check areas surrounding repaired locations.

10. Products using cathode ray tubes (CRTs)

In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the parts specified. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

11. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1) Connector part number : E03830-001

2) Required tool : Connector crimping tool of the proper type which will not damage insulated parts.

3) Replacement procedure

(1) Remove the old connector by cutting the wires at a point close to the connector.

Important : Do not reuse a connector (discard it).

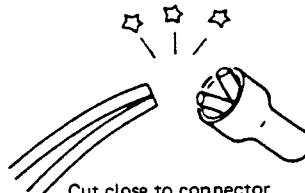


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

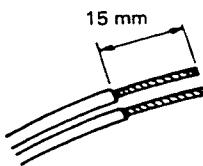


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

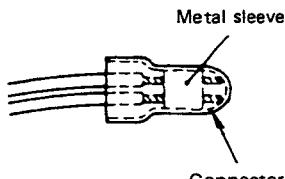


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

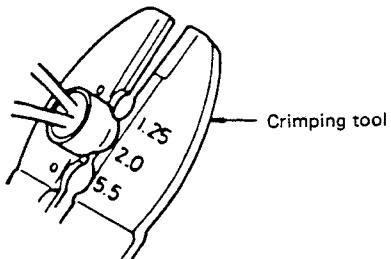


Fig. 6

(5) Check the four points noted in Fig. 7.

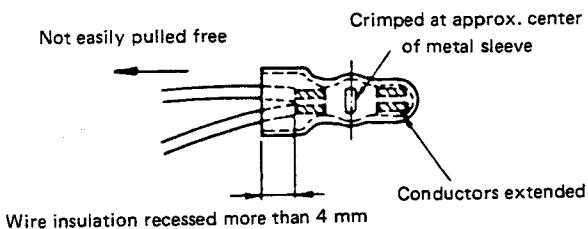


Fig. 7

Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table below.

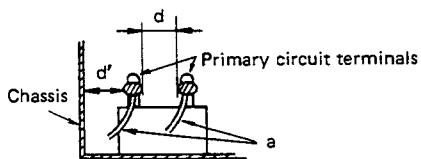


Fig. 8

4. Leakage current test

Confirm specified or lower leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)

Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

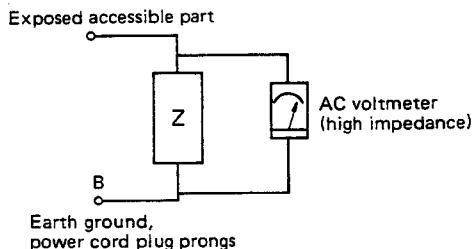


Fig. 9

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	$\geq 1 \text{ m}\Omega/500 \text{ V DC}$	1 kV 1 minute	$\geq 3 \text{ mm}$
110 to 130 V	USA & Canada	—	900 V 1 minute	$\geq 3.2 \text{ mm}$
*110 to 130 V 200 to 240 V	Europe Australia	$\geq 10 \text{ m}\Omega/500 \text{ V DC}$	4 kV 1 minute	$\geq 6 \text{ mm } (d)$ $\geq 8 \text{ mm } (d')$ (a: Power cord)

*Class II model only.

Table 1 Ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (b) to:
100 V	Japan	$0 - \text{---} - 1 \text{ k}\Omega$	$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada	$0.15 \mu\text{F} - \text{---} - 1.5 \text{ k}\Omega$	$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe Australia	$0 - \text{---} - 2 \text{ k}\Omega$ $0 - \text{---} - 50 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Antenna earth terminals Other terminals

Table 2 Leakage current ratings for selected areas

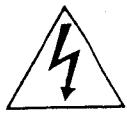
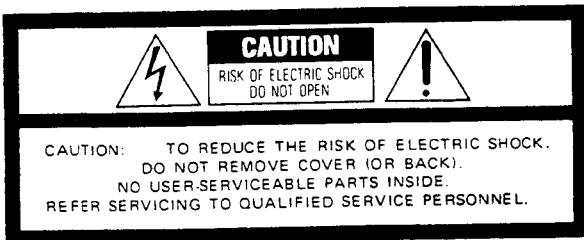
Note: This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

BR-8600U

INSTRUCTIONS

For reference, the text of the instruction booklet of this model is reproduced in the following pages.

Numbering of the pages also corresponds with that of the booklet.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated 'dangerous voltage' within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

This unit should be used with 120 V AC, 60 Hz or 50 Hz only.

CAUTION:

To prevent electric shocks and fire hazards, do NOT use any other power source.

Warning to Purchasers of USA: One Federal Court has held that recording copyrighted TV programs is infringement. Such programs should not be recorded.

NOTE:

The rating plate (serial number plate) is on the rear of the unit.

INFORMATION

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna;
- Relocate this equipment with respect to the receiver;
- Move this equipment away from the receiver;
- Plug this equipment into a different outlet so that this equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

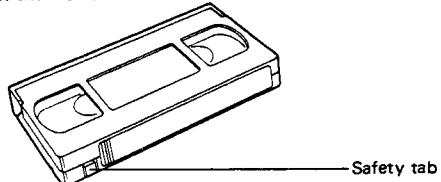
PRECAUTIONS

Handling and storage

- Avoid using the recorder under the following conditions:
 - extremely hot, cold or humid places,
 - dusty places,
 - near appliances generating strong magnetic fields,
 - places subject to vibrations, and
 - poorly ventilated places.
- Be careful of moisture condensation.
Avoid using the recorder immediately after moving it from a cold place to a warm place or soon after heating a room which was cold. The water vapor in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.
- Handle the recorder carefully.
 - Do not block the ventilation openings.
 - Do not place anything heavy on the recorder.
 - Do not place anything which might spill and cause trouble on the top cover of the recorder.
 - Use in horizontal (flat) position only.
- In case of transportation,
 - Avoid violent shocks to the recorder during packing and transportation.
 - Before packing, be sure to remove the cassette from the recorder.

Video cassettes

- The BR-8600U employs VHS-type cassettes only. T-160 for 160 minutes, T-120 for 120 minutes, T-90 for 90 minutes, T-60 for 60 minutes and T-30 for 30 minutes of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the hole.



- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

CONTENTS

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FEATURES

Professional-quality editing functions

The BR-8600U has a pair of rotary erase heads and a blanking switcher which make possible assemble and insert editing with virtually no distortion at the edit points. Edit flagging is minimized by use of a framing servo and extremely stable horizontal phase lock.

Preroll function for automatic editing

An independent PREROLL button is provided on the control panel to automatically backspace the tape by about 3 seconds of program time. When no edit controller is being used, reasonably accurate editing can be accomplished with two BR-8600U's utilizing the PREROLL buttons on the recorder and source. After locating the edit-in points using the convenient dial search controls, the machines are each prerolled. When the EDIT START buttons are pressed simultaneously, the edit takes place at the predetermined edit points.

Heavy-duty mechanism with direct-drive motors

The head drum is directly driven by a servo-controlled brushless DC motor, while the capstan and reels are also directly driven by independent DC motors. This assures highly stable pictures as well as greatly improved reliability. To add further to reliability and durability, the mechanism is supported by an aluminum diecast chassis.

Variable-speed dial search

A convenient, easy-to-operate control dial is provided for fast and accurate location of edit points. Turning this rotary dial varies the tape speed from still to 10 times normal, in both forward and reverse directions. The sensitivity of the control is dependent on the selected speed, so that fast, positive control of the tape is always maintained.

Video recording adjustment — video level/tracking meter

Normally the Automatic Gain Control (AGC) circuit optimizes the video recording current depending on the input video signal. For demanding professionals, however, this circuit can be defeated and the video level can be manually adjusted referring to the video level meter. During playback, the meter functions as a tracking meter and helps in precise playback adjustment together with an independent tracking control.

Two-channel audio for stereo recording and playback

Independent audio level meters are provided for channels 1 and 2. The audio levels of the two channels can therefore be separately adjusted. Independent audio limiters are provided and can be switched in and out as needs require.

Dolby* B noise reduction incorporated

To further improve sound quality by reducing tape hiss, Dolby B noise reduction circuitry is incorporated in the audio recording and playback circuits.

Improved color dubbing quality

The playback video signal is normally subjected to compensation so that the picture quality on the monitor is improved. However, non-compensated color signals are more suitable for dubbing and result in higher-quality color copies. In order to make this kind of signal available at the VIDEO OUT terminals, the BR-8600U is equipped with a switch labelled COLOR PROCESS. When the BR-8600U is used in a copying system, set this switch to OFF; the resulting tape will have a significantly improved color quality.

Three video inputs selectable

Three video inputs (LINE-1, LINE-2, 8-pin TV) are provided and the input select switch on the front panel makes it possible to incorporate signals from a tape, a camera or a TV monitor onto an edited tape by simply operating the switch.

Field-still and slow-motion playback

The BR-8600U has two pairs of video heads: one pair for recording and normal-speed playback, the other pair (extra video heads) for still and slow-motion playback. This is in keeping with JVC policy; recording of the highest possible quality is assured and stable pictures can be obtained even in still and slow-motion modes. Ease of locating edit points is considerably enhanced.

External sync capability

The BR-8600U is equipped with all the terminals and connectors required by video professionals for editing; the SYNC IN connector enables external synchronization so that the BR-8600U can easily be incorporated in an existing video system. By use of the SYNC IN connector, a time base corrector (TBC) can also be connected.

Total front operation

As well as the front cassette loading system, all switches and controls are accessible from the front. Conforming to the 19" rack mount standard, the BR-8600U presents no problem at all when it is to be installed in your existing production house.

Electronic tape counter/lap timer with fluorescent display

A 4-digit counter provides a convenient means of addressing tape segments. The display doubles as a 5-digit lap timer showing tape running time in hours, minutes and seconds. The fluorescent display used assures easy readability.

Tape end warning

About 5 minutes before the end of the tape, the electronic tape counter starts flashing, indicating that the tape is coming to an end.

Shuttle Search at about 10 times normal speed

Run the tape at about 10 times normal speed either forward or in reverse while watching the speeded-up picture. You can scan through a whole 2-hour program in about 12 minutes.

Automatic search and repeat

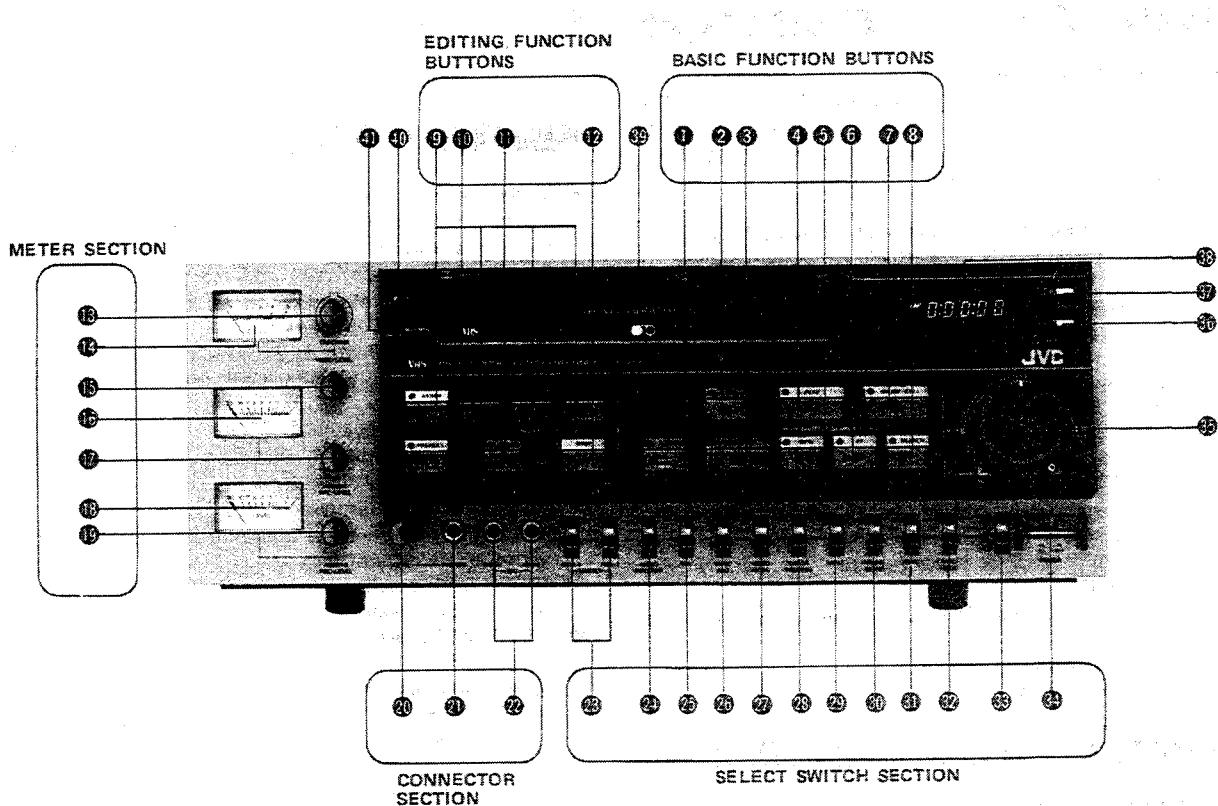
In conjunction with the tape counter, the automatic search mode enables any section of the program to be located automatically. In the automatic repeat mode, the entire tape is automatically played back any number of times.

Additional features

- External hour meter to show the running total of operating hours.
- Audio monitor output selectable (CH-1, CH-2, MIX).
- Automatic rewind at tape end.
- Electronic tape tension control.
- Condensation detector and built-in moisture condensation prevention heater.
- Warning indicator for any malfunction related to tape transport or moisture condensation.
- BNC video and RCA audio connectors.
- Front panel connectors for two microphones and a set of stereo headphones.
- 8-pin connector for TV monitor.
- 45-pin connector for editing or remote control unit.

* Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

CONTROLS AND CONNECTORS



BASIC FUNCTION BUTTONS

① EJECT button

Press to eject the cassette. This button can be pressed in the Stop mode or immediately after the STOP button has been pressed. The EJECT indicator will flash during automatic unloading of the cassette and then remain lit upon completion of ejection.

② Record button (REC)

Press together with the PLAY button for video and audio recording. Audio is recorded on both channels, if there are input signals for them. The REC and PLAY indicators light during recording. (The PLAY indicator flickers first until tape loading is completed.)

③ STOP button

To stop the tape. When the STOP button is pressed, the tape is unloaded and then the Stop mode is engaged. The STOP indicator flickers during tape unloading and remains lit upon completion of unloading.

④ PLAY button

Press to start playback. The PLAY indicator will light. Press together with the REC button to start recording.

⑤ Rewind button (REW)

Press to rewind the tape inside the cassette. While the tape is being rewound, the REW indicator will light. This button can be pressed in any mode except Record, Audio Dub or Eject. To release the Rewind mode, press the PLAY, STOP or FF button depending on the mode you want to select next. Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the reverse direction. During search the REW indicator will remain lit.

⑥ Fast Forward button (FF)

Press to fast forward the tape inside the cassette. While the tape is being fast forwarded, the FF indicator will light. This button can be pressed in any mode except Record, Audio Dub or Eject. To release the Fast Forward mode, press the PLAY, STOP or REW button depending on the mode you want to select next. Pressing this button in the Play or Still mode enables high-speed playback at about 10 times normal in the forward direction. During search the FF indicator will remain lit.

⑦ PAUSE/STILL button

Press to stop the tape temporarily during recording or playback. To release the Pause or Still mode, press any button except EJECT corresponding to the mode you wish to enter next.

⑧ SEARCH button

Press to change the playback speed instantly to that previously set with the rotary search dial ⑩.

EDITING FUNCTION BUTTONS

⑨ Edit mode select buttons

ASSEM: When this button is pressed to ON (the LED will light), video, audio-1 and audio-2 signals are all assemble-edited when the EDIT START button is pressed.

INSERT

AUDIO-1: Press to ON to insert-edit the audio-1 signal.

AUDIO-2: Press to ON to insert-edit the audio-2 signal.

VIDEO: Press to ON to insert-edit the video signal.

- To release these buttons to OFF, press them once again.
- The AUDIO-1, AUDIO-2 and VIDEO buttons can be pressed to ON in any combination. Also, these buttons can be switched ON or OFF even during insert-editing.

⑩ PREROLL button

Operative in the Pause or Still mode. When this button is pressed after the edit point has been determined with the PAUSE/STILL button, the tape is rewound by about 2.5 seconds of program time and enters the Edit Standby mode. (The PREROLL indicator lights.) To cancel this mode, press the EDIT STOP or PLAY button.

⑪ EDIT START button

Press to start editing. This button functions only in the Play mode.

⑫ EDIT STOP button

Press to stop editing.

METER SECTION

⑬ TRACKING control

To remove noise bars during playback, turn this control so that the meter ⑭ makes its maximum deflection.

⑭ TRACKING/VIDEO LEVEL meter

This meter functions as a tracking meter during playback and as a video level meter during recording.

⑮ VIDEO LEVEL control

To adjust the video recording current manually, set the VIDEO AGC switch ⑯ to OFF and turn this control so that the meter ⑭ deflects into the green area.

⑯ AUDIO-1 REC LEVEL meter

This meter indicates the level of the audio-1 signal during recording and playback.

⑰ AUDIO-1 REC LEVEL control

To adjust the audio-1 recording level, turn this control so that the meter ⑯ deflects to "0" with the loudest signal.

⑱ AUDIO-2 REC LEVEL meter

This meter indicates the level of the audio-2 signal during recording and playback.

⑲ AUDIO-2 REC LEVEL control

To adjust the audio-2 recording level, turn this control so that the meter ⑯ deflects to "0" with the loudest signal.

CONNECTOR SECTION

⑳ PHONES LEVEL control

Turn to adjust the output level of the PHONES jack.

㉑ PHONES jack

Connect a set of headphones having an impedance of 8 ohms. The signal selected with the AUDIO MONITOR switch ㉔ can be heard.

㉒ Microphone jacks (MIC AUD-1, AUD-2)

Connect microphones having an impedance of 600 ohms and a sensitivity of -70 dBm.

SELECT SWITCH SECTION

㉓ Audio limiter switches (LIMITER AUD-1, AUD-2)

Set to ON to activate the built-in audio limiter circuit. The limiter circuit can be switched on or off separately for the two audio tracks and manual level control is possible even when the limiter circuit is switched on.

㉔ AUDIO MONITOR select switch

This switch selects the audio output available from the 8-pin TV connector, headphone jack and AUDIO MONITOR connector.

AUD-1: To hear the audio-1 signal.

MIX: To hear a mixture of audio-1 and audio-2 signals.

AUD-2: To hear the audio-2 signal.

㉕ Audio noise reduction switch (NR)

Set to ON to activate the built-in Dolby* noise reduction system to reduce tape hiss.

㉖ VIDEO AGC switch

Set to ON to activate the built-in video AGC circuit.

㉗ VIDEO MODE select switch

Select one of the two positions according to the input signal during recording or the output signal during playback.

AUTO: The circuit is automatically switched between color and black/white, allowing optimum recording or playback. When this position is used with black/white signals, a higher resolution can be obtained.

COLOR: Set to this position when the input or playback video signal is a color signal.

㉘ COLOR PROCESS switch

When two BR-8600U's are used for dubbing or editing, set this switch to OFF. This will provide stable color recordings. Normally set the switch to ON.

㉙ INPUT select switch

TV: Set to this position to record video and audio signals input via the 8-pin TV connector. In this case, the audio signal is recorded on the audio-1 track.

LINE-1: Set to this position to record video signals input via the VIDEO IN LINE-1 connector and audio signals input via the AUDIO IN (AUD-1, AUD-2) connectors or the MIC (AUD-1, AUD-2) jacks.

LINE-2: Set to this position to record video signals input via the VIDEO IN LINE-2 connector and audio signals input via the AUDIO IN (AUD-1, AUD-2) connectors or the MIC (AUD-1, AUD-2) jacks.

㉚ FRAME SERVO switch

Normally set this switch to ON. When tapes containing random-interlaced or low-S/N video signals are used, set to OFF.

㉛ SYNC select switch

For selecting between different reference sync signals for the servo system during recording and playback. For more information refer to "REFERENCE SYNC SIGNALS FOR RECORDING AND PLAYBACK" on page 15.

⑨ AUTO MODE switch

This switch selects automatic operations.

MEMORY: The tape stops automatically when it is rewound or fast forwarded to the point corresponding to the counter reading of "0" and the unit enters the Stop mode.

OFF: No automatic operation.

REPEAT: When the tape is rewound to its beginning, it stops and then is reloaded automatically to repeat playback.

⑩ LOCAL/REMOTE select switch

LOCAL: Set to this position when the recorder is to be controlled with its own function buttons. (With this switch set to the LOCAL position, the remote control unit connected to the rear panel 45-pin REMOTE connector will not function.)

REMOTE: Set to this position when the recorder is to be remote-controlled with the remote control unit connected to the 45-pin REMOTE connector. (No function buttons of the recorder except STOP and EJECT will function when this switch is set to the REMOTE position.)

⑪ POWER button

Press to turn the power on. The level meters and the counter display will be illuminated. Pressing again will switch the power off.

⑫ Search dial

This search dial becomes operative by pressing the SEARCH button ⑬.

When the dial is set to STILL (center position), the Still mode is engaged. When the dial is turned clockwise toward FWD, forward playback takes place at a speed corresponding to the dial setting. When the dial is turned counterclockwise toward REV, reverse playback takes place at a speed corresponding to the dial setting. The search speed is continuously variable between 1/15 and 5 times normal in both directions. When the dial is turned fully clockwise or counterclockwise past the 5-times-normal setting, the maximum search speed of about 10 times normal is obtained. If the control mode is changed by any function button, the dial setting remains unchanged; when the SEARCH button ⑬ is pressed, playback speed and direction corresponding to the dial setting are automatically restored.

⑯ Counter reset button (RESET)

Press to reset the tape or lap time counter to zero.

⑰ Display mode select button (TAPE/LAP)

The fluorescent display functions as a tape counter with this button in its "out" position. When the button is pressed in, the display changes to a lap time counter. To change back to the tape counter, press the button once again.

⑲ Electronic tape counter/Lap time counter/Tape-end warning indicator

This fluorescent display functions as a 4-digit tape counter or a 5-digit lap time indicator depending on the setting of the display mode select button. In either mode, the display starts flashing 5 to 10 minutes before the tape end during recording. While the tape is being wound in the forward direction, the counter reading advances in the direction of increasing numbers. While the tape is being wound in the reverse direction, the counter reading changes in the direction of decreasing numbers and after zero a "minus" sign appears.

⑳ Cassette loading slot

With the POWER button pressed to ON, insert a video cassette with its labelled edge facing toward you. The cassette carriage itself will automatically take control and retract the cassette into the correct loaded position. The lower door flap will change color to show that a cassette is loaded.

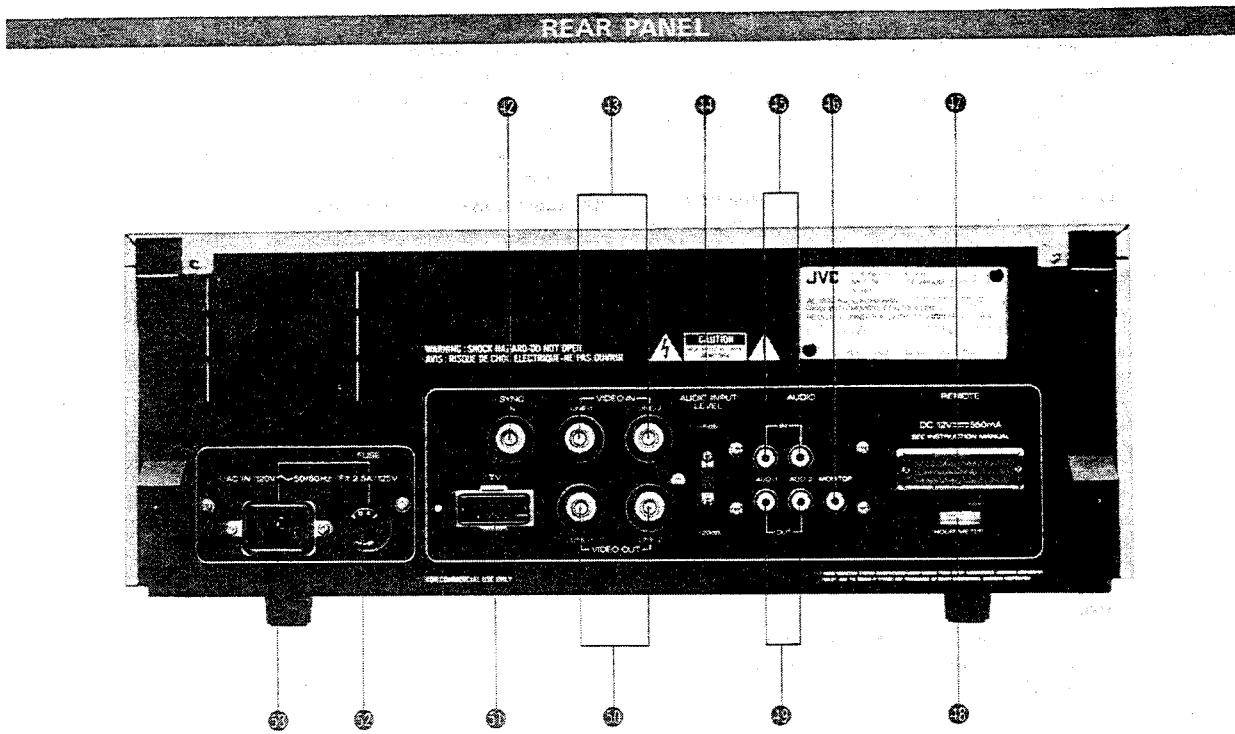
㉑ Audio noise reduction indicator (NR)

Lights when the built-in Dolby* noise reduction system is activated.

㉒ WARNING indicator (WARNING)

If the tape running is in some way incorrect, this indicator starts flashing. The causes may be:

- (1) the moisture condensation sensor is in operation;
- (2) the tape-end sensor lamp has blown;
- (3) the head drum does not rotate;
- (4) the eject mechanism does not operate properly;
- (5) the automatic loading and unloading mechanism does not operate properly;
- (6) the tape stops running, or
- (7) a tape recorded in the EP (Extended Play) mode is played back.



⑫ External sync signal input connector (SYNC IN)

This input connector accepts an external reference sync signal when the recorder is to be operated in the external sync mode. The external sync signal can be a composite sync signal or a composite video signal.

⑬ VIDEO IN connectors (LINE-1, LINE-2)

Input connectors for video signals.

⑭ Audio input level select switch (AUDIO INPUT LEVEL)

Select either -6 dB or -20 dB according to the level of the audio input signal. The level is switched for both audio channels simultaneously.

⑮ AUDIO IN connectors (AUD-1, AUD-2)

Input connectors for audio-1 and audio-2 signals.

⑯ AUDIO MONITOR output connector

The audio signal selected by the AUDIO MONITOR switch is present at this connector.

⑰ REMOTE control connector

Connect a JVC remote control unit.

⑱ Hour meter (HOUR METER)

This indicates the total operating time. After 1,000 hours of operation, the red line moves to the right end of the scale.

⑲ AUDIO OUTPUT connectors (AUD-1, AUD-2)

Output connectors for audio-1 and audio-2 signals.

⑳ VIDEO OUT connectors (LINE-1, LINE-2)

Output connectors for video signals.

㉑ TV monitor connector (TV)

This is an 8-pin input/output connector for the connection of a TV monitor. The audio signal selected by the AUDIO MONITOR switch is present at the audio output terminal.

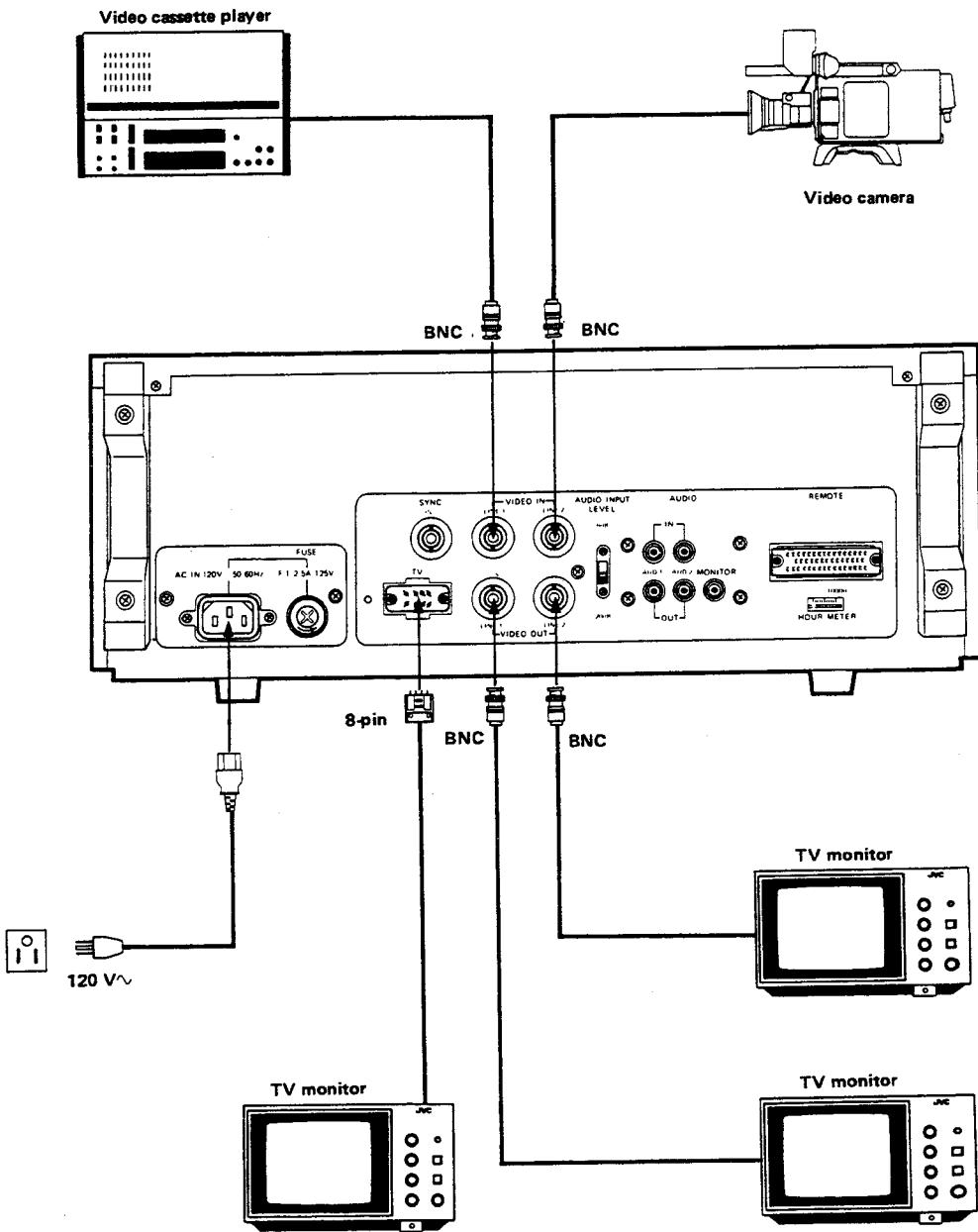
㉒ Fuse holder

㉓ AC input socket (AC IN)

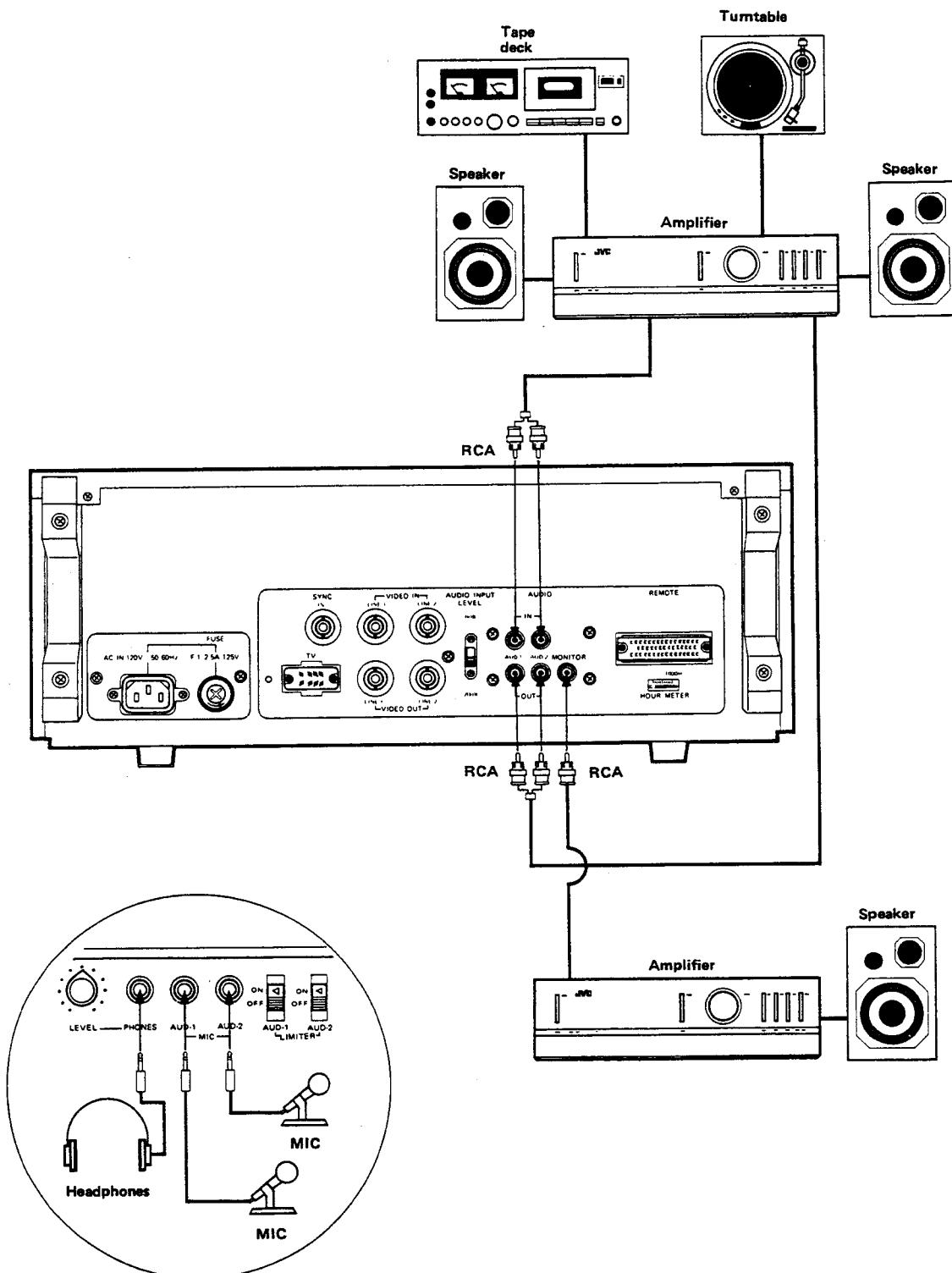
Connect to a 120 V AC, 50 Hz or 60 Hz power outlet.

CONNECTIONS

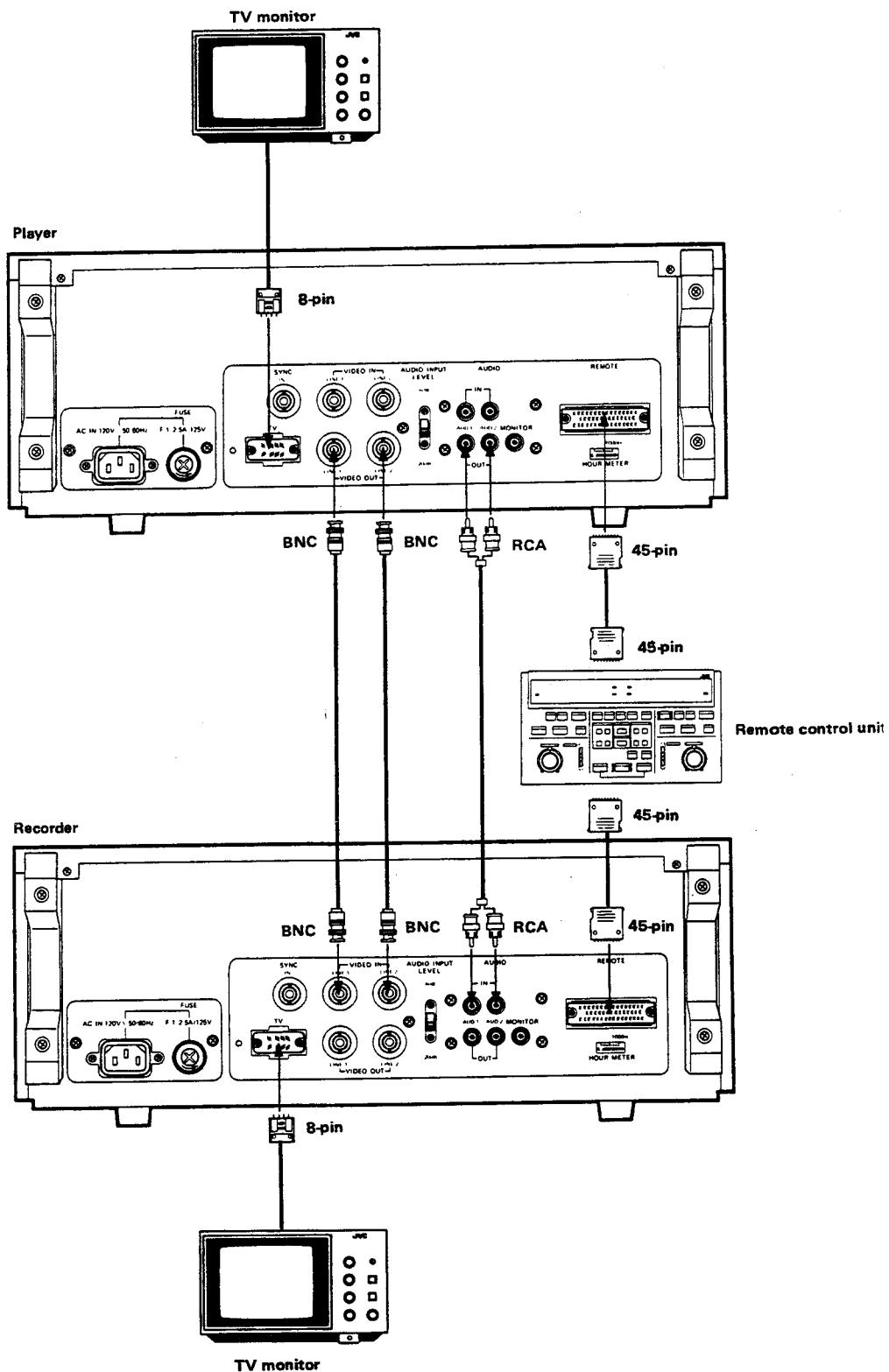
VIDEO EQUIPMENT CONNECTION



AUDIO EQUIPMENT CONNECTION

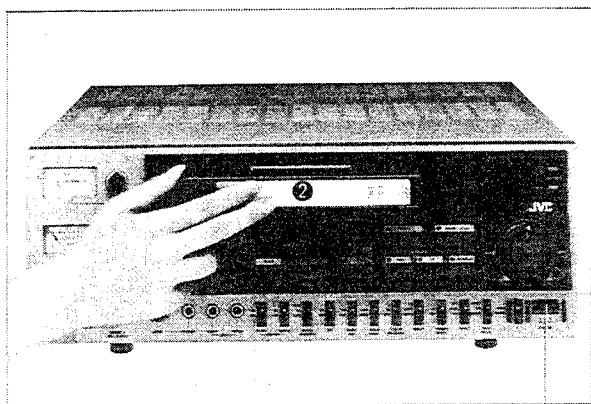


CONNECTION FOR TAPE-TO-TAPE EDITING



LOADING AND UNLOADING A VIDEO CASSETTE

LOADING

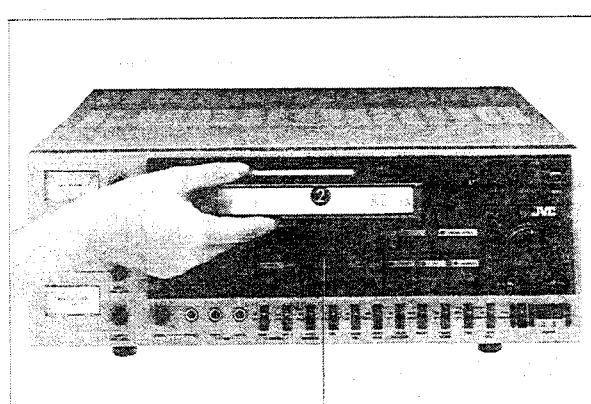


- ① Press the POWER button to ON. The EJECT indicator will flash.
- ② After the EJECT indicator stops flashing and remains lit, insert a cassette with its labelled side facing you. The cassette will automatically be retracted and loaded in the correct position.
 - With a cassette inserted, the red door flap appears and displays the  mark to indicate "cassette inserted".
 - The STOP indicator will flash during automatic loading of the cassette and, when it has been correctly loaded, will remain lit.
 - The automatic loading mechanism will operate only when the cassette is inserted correctly.
 - If loading does not result in positioning the cassette correctly, it will automatically be ejected after about 6 seconds.

Note:

After unpacking your new recorder the red door flap with the "cassette inserted" mark may be displayed. This is not due to any defect of the unit. Simply insert a cassette. After the first loading/unloading cycle, the door will function properly to show the blue flap when no cassette is inserted and the red flap when a cassette is inserted.

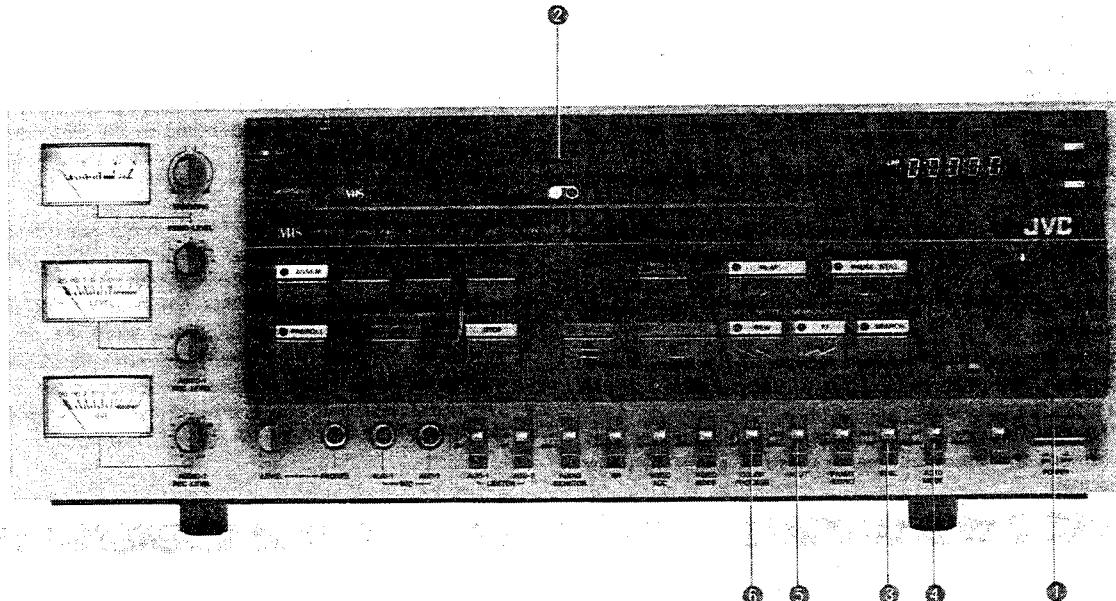
UNLOADING



- ① Press the EJECT button in the Stop mode. The cassette will automatically be ejected.
- ② Remove the cassette from the cassette loading slot.
 - The EJECT indicator will flash during automatic unloading of the cassette and then remains lit upon completion of ejection.
 - The EJECT button can be pressed immediately after the STOP button has been pressed. The logic circuit will memorize the sequence; first setting the recorder in the Stop mode and then automatically changing it to the Eject mode.

PLAYBACK

PREPARATIONS



- ① Press the POWER button to ON.
- ② Insert a pre-recorded video cassette into the cassette loading slot.
- ③ Set the SYNC switch to VIDEO.
 - If an external sync signal is used, set it to EXT.
- ④ Set the AUTO MODE switch to OFF.
- ⑤ Set the INPUT select switch to either LINE-1 or LINE-2.
- ⑥ Set the COLOR PROCESS switch to ON.

Note:

If a video signal is applied to either VIDEO IN connector, playback is locked to this video signal. Therefore, if the sync signal contained in this video signal is not stable, the playback picture will be distorted when the SYNC switch is in the VIDEO position. In such a case, reset the switch to INT to engage the internal sync mode.

Procedure

1. Press the PLAY button. The tape will start running and the playback picture will appear on the monitor screen.
2. Press the STOP button to stop playback.

Tracking adjustment

When a tape recorded with a different recorder is played back, noise bars may appear or the picture may be blurred. In such a case, turn the TRACKING control to correct the picture referring to both the monitored picture and the tracking meter (VIDEO LEVEL meter). Optimum tracking is obtained when the meter makes its maximum deflection.

Note:

It is recommended that tracking be checked even when tapes recorded using this unit are played back.

Input monitoring during playback

If you wish to monitor the signal applied to the input connector during playback, press the REC button in the Play mode. The input signal will appear on the monitor screen.

Note:

Do not press the REC and PLAY buttons simultaneously, otherwise the unit enters the Record mode and any recordings on the tape are erased.

DIAL SEARCH & SHUTTLE SEARCH

VARIABLE-SPEED DIAL SEARCH IN BOTH DIRECTIONS

This function is very useful in locating edit points quickly. The search speed is continuously variable between about 1/15 and 5 times normal in both directions. The speed of about 10 times normal is also available when the dial is fully turned in either direction.

1. Turn the search dial until the desired search speed is reached.

- The STILL position (center click-stop) provides a still picture.
- Turn the dial clockwise to search in the forward direction; counterclockwise to search in the reverse direction.
- The X1 click-stop provides normal speed in the forward direction and X-1 gives normal speed in the reverse direction.
- There is another click-stop between X1 and X10 and between X-1 and X-10. This is the position for the 5 times normal speed.
- The fully clockwise or counterclockwise position corresponds the maximum search speed of about 10 times normal.

2. To cancel the adjusted speed, simply press the PLAY, PAUSE/STILL, REW, FF or STOP button depending on the mode to be entered next. The dial setting remains unchanged.

- To enter the dial search mode again, press the SEARCH button. The speed corresponding to the dial setting will be restored instantly.

Notes:

- During search, an extra pair of video heads operate and pick up only odd-number fields of the picture. When the dial is set to X1 or X-1, frame playback is engaged.
- If the Still mode continues for too long a time, the tape could be damaged. Therefore, if you leave the unit in the Still mode for more than about 3 minutes 45 seconds, the video track being traced will shift automatically.
- The search dial does not function for about 2 seconds after the REMOTE/LOCAL switch is reset to REMOTE.

SHUTTLE SEARCH & REW/FF

When the REW or FF SHUTTLE SEARCH button is pressed in the Stop mode, normal rewind or fast forward takes place. When these buttons are pressed in the Play, Search or Still mode, the tape runs at about 10 times normal speed in the corresponding direction. The buttons can be locked and the indicator lights. You can follow the speeded-up picture on the monitor screen.

REPEAT PLAYBACK, COUNTER SEARCH & AUTO REWIND

REPEAT PLAYBACK

When the entire tape, from the beginning to the end, is to be repeated, proceed as follows:

1. Set the AUTO MODE switch to REPEAT.

2. Press the PLAY button to start playback.

- When the tape reaches its end, it is rewound to the beginning and then played back again automatically. The procedure is repeated as many times as desired.

COUNTER SEARCH

The counter search mechanism functions in conjunction with the tape counter and stops the tape automatically in the Rewind or Fast Forward mode at the counter reading of "0".

1. Change the display to the tape counter mode by pressing the TAPE/LAP button.
2. Press the COUNTER RESET button at a point which you may wish to locate later.
3. Set the AUTO MODE switch to SEARCH.

4. Press the REW or FF button when you need to return to the designated point. The tape will stop automatically at the counter reading of "0".

Notes:

- The counter search mechanism does not function in the Shuttle Search mode.
- The tape may stop at a position slightly deviated from the counter reading of "0".

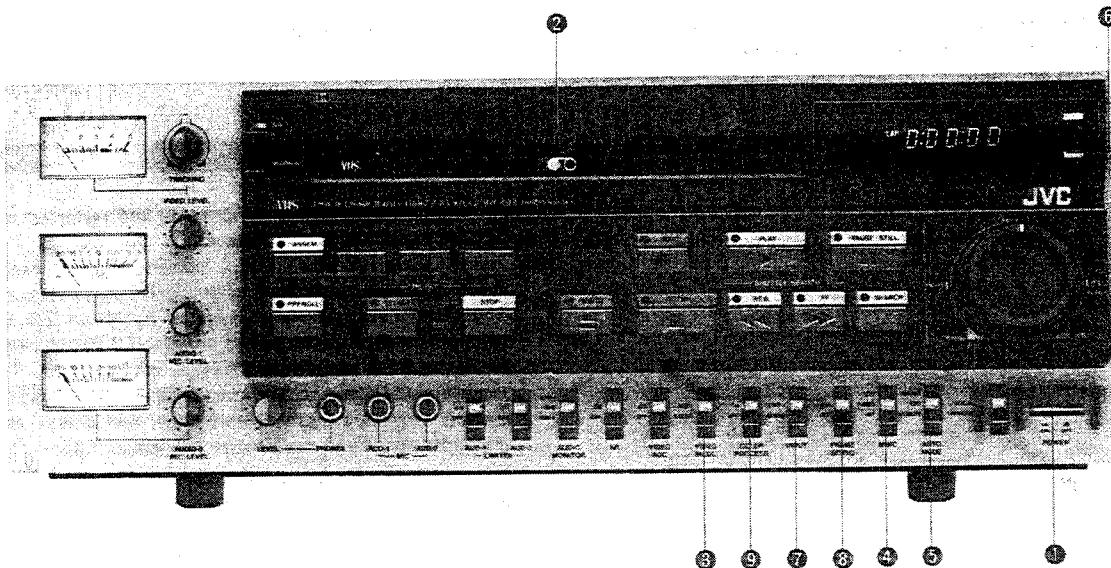
AUTO REWIND

When the tape reaches its end in the Play or Record mode, it is automatically rewound to the beginning and then the Stop mode is engaged. The counter search mechanism functions automatically while the tape is being rewound. If the

tape reaches its end in the Fast Forward mode, the auto rewind mechanism does not function and the Stop mode is engaged immediately.

RECORDING

PREPARATIONS



- ① Press the POWER button to ON.
- ② Insert a video cassette into the cassette loading slot.
- ③ Set the VIDEO MODE switch to AUTO.
 - If a recording is to be made from a more than third-generation copy, set this switch to COLOR.
- ④ Set the SYNC switch to VIDEO.
 - If an external sync signal is used, set it to EXT.
- ⑤ Set the AUTO MODE switch to OFF.
- ⑥ Reset the tape counter by pressing the COUNTER RESET button.
- ⑦ Set the INPUT select switch as required.

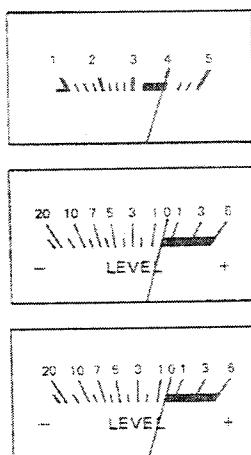
TV: To record signals from the TV monitor connected to the 8-pin TV connector. The audio signal will be recorded on the audio-1 track.

LINE-1: To record the video signal from a source connected to the VIDEO IN LINE-1 connector together with the audio signals from the AUDIO IN AUD-1 and AUD-2 connectors or the MIC AUD-1 and AUD-2 jacks.

LINE-2: To record the video signal from a source connected to the VIDEO IN LINE-2 connector together with the audio signals from the AUDIO IN AUD-1 and AUD-2 connectors or the MIC AUD-1 and AUD-2 jacks.

- If a microphone is connected to either MIC jack, the input from the corresponding AUDIO IN connector is automatically switched off.
- ⑧ Set the FRAME SERVO switch to ON if framing servo is to be applied to recordings.
 - It is recommended that this switch be set to OFF when you record from a tape whose playback picture has an inferior S/N ratio, a more than third-generation copy, a tape recorded using a random-interlaced ITV camera or a tape edited using another manufacturer's editor.
- ⑨ Set the COLOR PROCESS switch to ON.

RECORDING LEVEL ADJUSTMENTS



Video level adjustment

- For automatic level control, set the VIDEO AGC switch to ON.
- For manual level control, set the VIDEO AGC to OFF and turn the VIDEO LEVEL control so that the VIDEO meter deflects into the green zone while applying the video signal to be recorded.

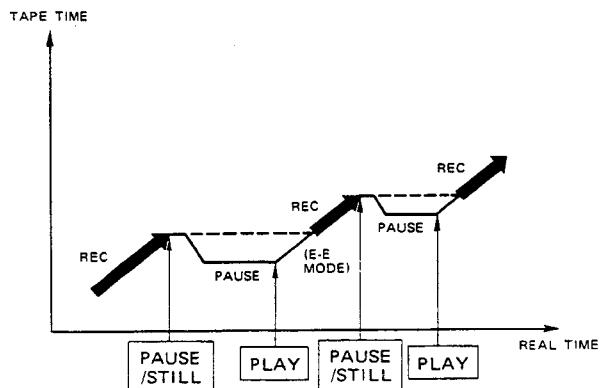
Audio level adjustment

- Set the AUDIO INPUT LEVEL switch, on the rear panel, depending on the input signal level.
- Turn the AUDIO REC LEVEL control until the AUDIO meter deflects to "0" with the loudest signal. This is the standard adjustment of the audio recording level.
- Set the LIMITER switch to ON to avoid eventual over-level recordings.

RECORDING

1. Press the REC and PLAY buttons simultaneously. The Record mode will be engaged and both the REC and PLAY indicators will light.
2. Press the STOP button to stop recording.

RECORD PAUSE & ASSEMBLE RECORDINGS



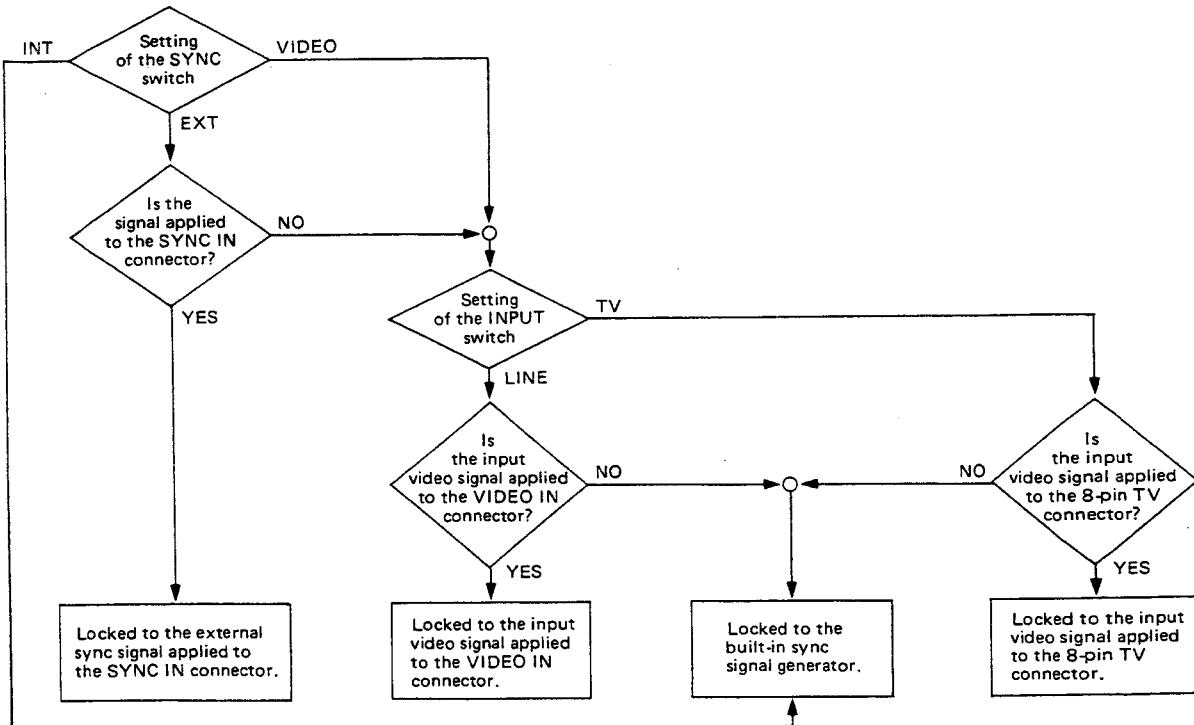
Recording can be stopped temporarily and restarted without detectable distortion in the picture.

1. Press the PAUSE/STILL button during recording. Recording will be stopped with the REC indicator still lit. The tape is automatically rewound by about 2.5 seconds of program time and stops in the Record Pause mode with both the REC and PAUSE/STILL indicators lit. The E-E picture will appear on the screen. When the PAUSE/STILL button is pressed again in this state, the picture recorded immediately before can be seen as a still picture.
- If recording is restarted immediately after the still picture appears, the top portion of the picture at the edit point may be skewed.
2. To restart recording, press the PLAY button. The tape will be played back for about 2.5 seconds (the picture on the screen is not the playback picture, but the input signal to be recorded) and the mode will switch automatically from playback to recording at the point where the PAUSE/STILL button was pressed.

REFERENCE SYNC SIGNALS FOR RECORDING AND PLAYBACK

The reference sync signal for the servo systems during recording and playback differs as illustrated below, depending on

the settings of the SYNC and INPUT select switches and the conditions of the signals applied to the input terminals.



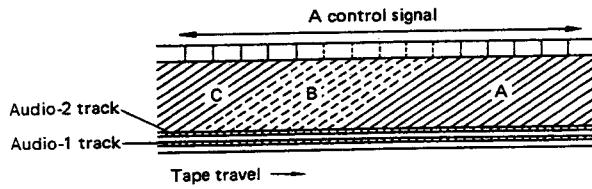
ELECTRONIC EDITING

TYPES OF ELECTRONIC EDITING

Electronic editing includes two different types of function; insert editing and assemble editing. The signals to be inserted or assembled can be camera signals, TV broadcast signals or playback signals from a video cassette recorder.

Insert editing

Insert editing is a technique for replacing part of the recorded video and/or audio signals with new recordings, utilizing the control signals already recorded.



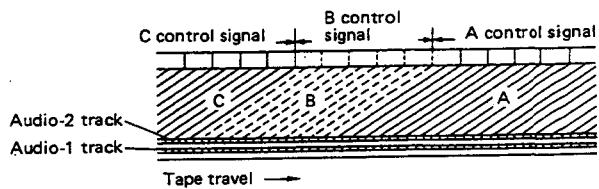
In the Insert Edit mode, the video, audio-1 and audio-2 signals can be recorded separately or in any combination. This means you can edit both video and audio signals simultaneously or first edit the video signal and then the audio signals in accordance with the newly recorded video signal. Or you can edit the audio signals first and then record new images in accordance with the sound.

Note:

Insert editing should be applied to those tape segments on which the video and control signals have been correctly recorded in advance.

Assemble editing

Assemble editing is a technique in which video and audio signals together with the control signal are newly recorded following an already recorded control signal to edit a full-length tape. This is convenient for editing short scenes one after another.



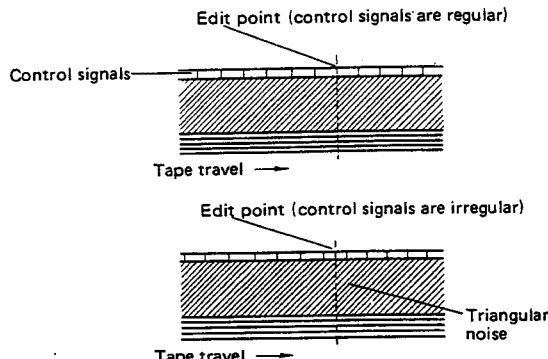
MECHANISMS FOR ENHANCING EDITING ACCURACY

The BR-8600U is fully equipped for high-accuracy electronic editing.

Rotary erase mechanism

The rotary erase mechanism is essential for quality edits. A pair of erase heads are mounted on the head drum each before a corresponding video head and, in both insert and assemble editing, these erase heads erase the recorded signal on each track before the video heads record new signals. Unlike home-use editing mechanisms using a fixed erase head which allow new recordings over old ones and result in triangular noise, the rotary erase mechanism provides cleaner edits free from noticeable distortion. It also enables separate use of the video, audio-1 and audio-2 tracks for flexible editing.

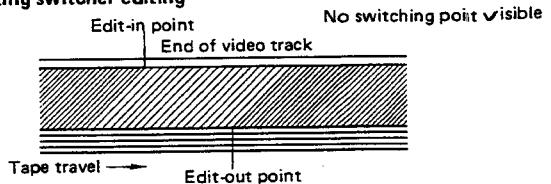
Electronic editing



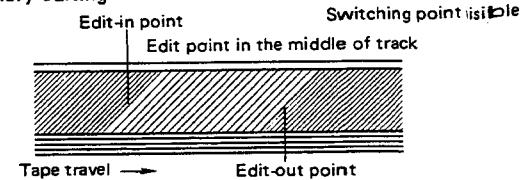
Blanking switcher mechanism

The rotary erase mechanism cannot provide perfect edits on its own. If editing is started in the middle of one video track, a switching point will be noticeable on the screen momentarily. To avoid this, the blanking switcher mechanism controls editing so that the switching point always falls on the blanking period of the video signal (during this period, switching from one track to another takes place in perfect synchronization outside the raster). Because the signal is not visible on the screen during the blanking period, there is no distortion at edit points.

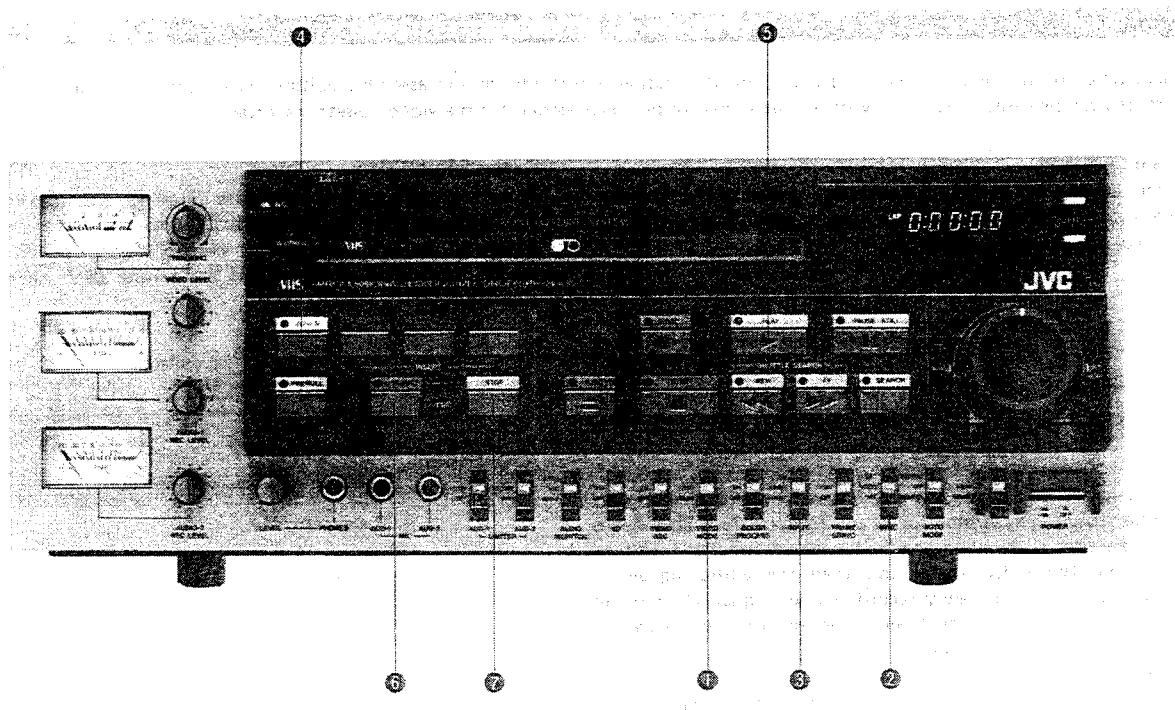
Blanking switcher editing



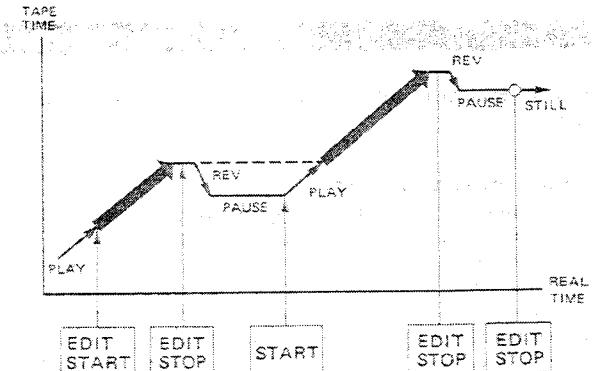
Ordinary editing



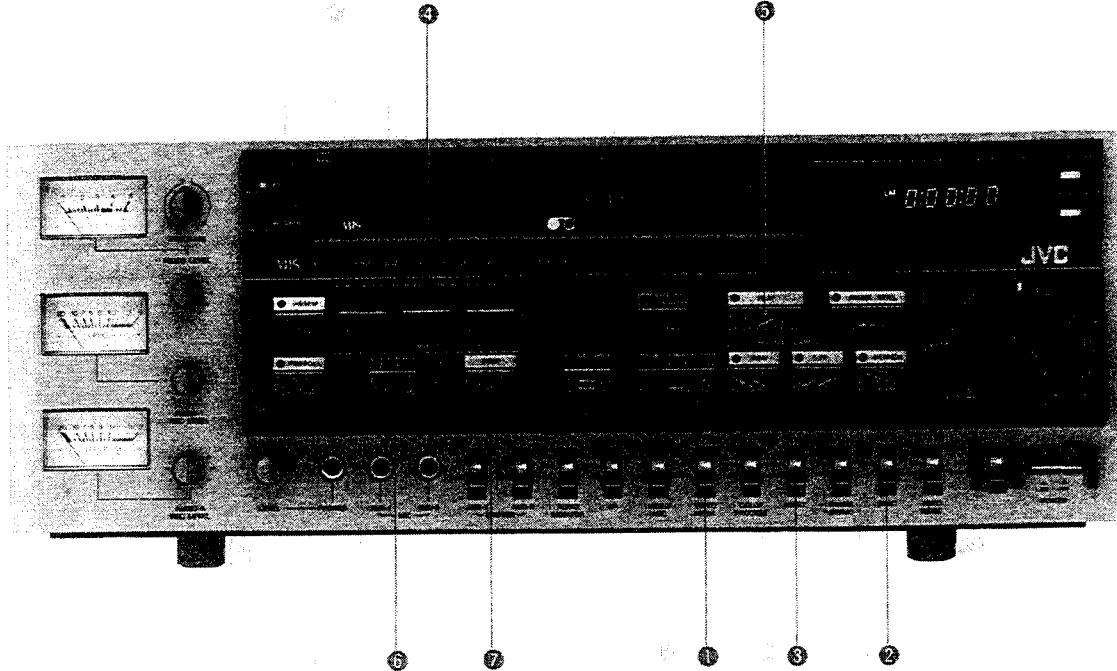
ASSEMBLE EDITING



- Press the POWER button to ON and load a video cassette correctly.
- ① Set the VIDEO MODE switch to AUTO.
 - If you are going to record from a more than third-generation copy, set it to COLOR.
- ② Set the SYNC switch to VIDEO.
 - If external sync is to be applied, set it to EXT.
- ③ Set the INPUT select switch as required.
 - Refer to page 14.
- ④ Press the ASSEMBLE button to ON.
- ⑤ Press the PLAY button to start playback.
- ⑥ Press the EDIT START button at the point where you wish to introduce new program material. The video and audio signals are all recorded simultaneously.
- ⑦ Press the EDIT STOP button to stop assemble editing. This cancels recording and rewinds the tape for about 2.5 seconds of program time and stops. The Record Pause mode has been engaged and the PREROLL indicator lights.
- ⑧ To assemble more program material following the previous edit, press the EDIT START button. First the Play mode is entered and, when playback proceeds to the point where the previous edit ended, recording of the new program material begins automatically.
- ⑨ Assembling of successive program segments can be continued simply by pressing the EDIT STOP and the EDIT START buttons alternately.
- ⑩ To cancel the Record Pause mode after completion of the assemble editing process, press either the PLAY button or the EDIT STOP button.



INSERT EDITING



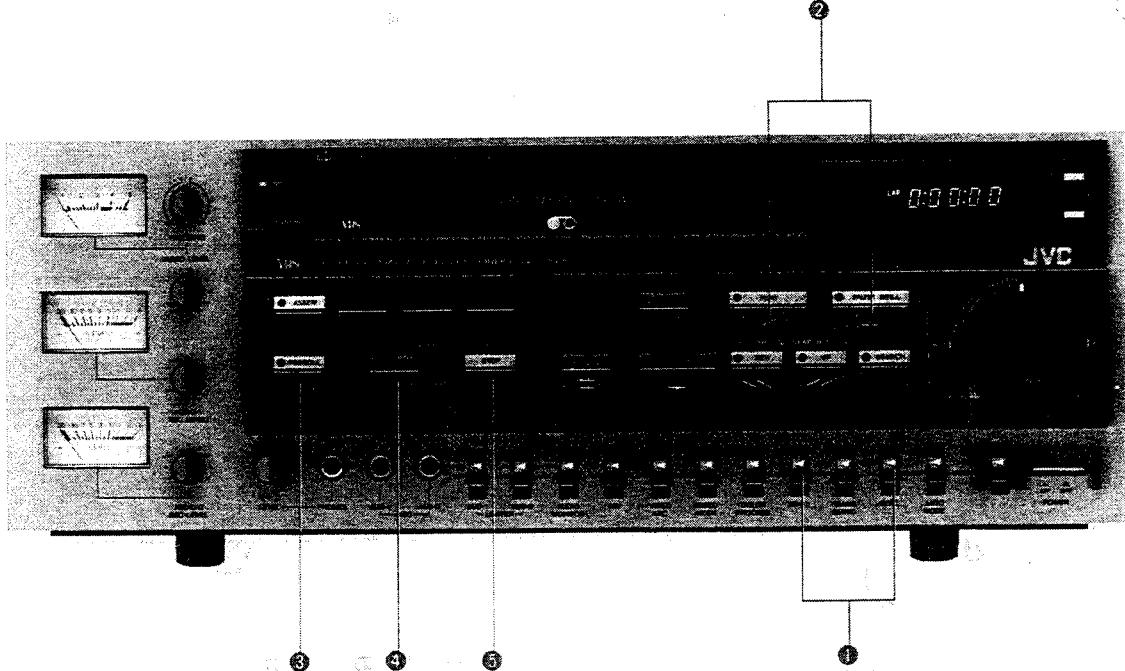
- Press the POWER button to ON and insert a video cassette correctly.
- ① Set the VIDEO MODE switch as required.
 - Refer to page 17.
- ② Set the SYNC switch as required.
 - Refer to page 17.
- ③ Set the INPUT select switch as required.
 - Refer to page 17.
- ④ Press one or more of the INSERT buttons depending on the signals to be inserted.
 - AUDIO-1: Press this button to ON when you wish to replace the sound on the audio-1 track. Leave it OFF to preserve the original sound.
 - AUDIO-2: Press this button to ON when you wish to replace the sound on the audio-2 track. Leave it OFF to preserve the original sound.
 - VIDEO: Press this button to ON to replace the video signal with new material. Leave it OFF to preserve the original picture.

- ⑤ Press the PLAY button to start playback.
- ⑥ Press the EDIT START button at the point where you wish to insert new program material. Recording will take place only for the channels which have been selected with the INSERT buttons.
Note: The INSERT buttons (VIDEO, AUDIO-1 and AUDIO-2) can be switched ON or OFF independently at any time while in the Insert Edit mode.
- ⑦ To stop insert editing, press the EDIT STOP button. The recorder will enter the Play mode.

Notes:

- Insert editing is not possible with tapes without correctly recorded control signals.
- Insert editing will stop automatically if a tape segment without correctly recorded control signals is reached.

PREROLL EDITING



This function enables edit-in points to be determined accurately in both the Assemble and Insert Edit modes.

- Press the POWER button to ON and insert a video cassette correctly.
- ① Set the SYNC and INPUT switches as required.
- ② Press the PLAY button to start playback and determine the edit-in point using search functions (see page 13). Press the PAUSE/STILL button at the edit-in point.
- ③ Press the PREROLL button. The tape will be rewound by about 2.5 seconds of program time and stop in the Pause mode. The PREROLL indicator will light to show that you are ready to start editing.

- ④ Press the EDIT START button. First the Play mode is engaged and then the recorder automatically switches to the Record mode at the predetermined edit-in point. The PLAY indicator will light.
- ⑤ To stop editing, press the EDIT STOP button.
 - In the Insert Edit mode, the Play mode will be entered.
 - In the Assemble Edit mode, the Record Pause mode will be entered.

DETERMINING EDIT-OUT POINTS

The BR-8600U permits edit-out points to be determined using the tape counter.

- 1. Press the TAPE/LAP button to engage the Tape Counter mode.
- 2. Press the PLAY button to start playback and press the COUNTER RESET button at a point you want to stop editing.
- 3. Set the AUTO MODE switch to MEMORY.
- 4. Rewind the tape and start editing (assemble, insert or preroll editing).

- 5. Editing will stop automatically at the point where the tape counter was reset to "0".
 - In the Insert Edit mode, the Play mode will be entered.
 - In the Assemble Edit mode, the Record Pause mode will be entered.

Note:

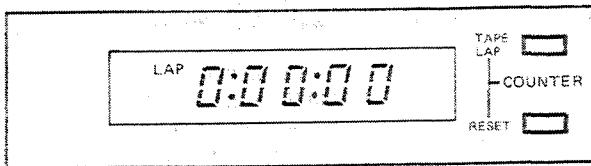
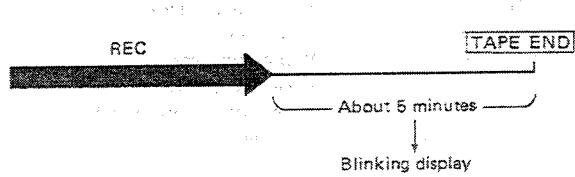
The edit out point may deviate from the counter reading of "0" by a few frames.

WARNING INDICATORS

TAPE END WARNING

Tape end warning is given only during recording.

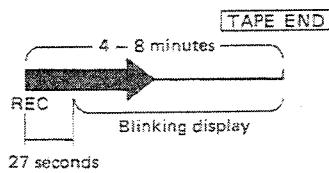
- The counter display starts blinking about 5 minutes before the end of the tape during recording.



Notes:

- The timing of tape end warning differs slightly depending on the type of cassette.
 - With a TC-20 compact video cassette (in its adapter), tape end warning does not function.

- If recording is started with a cassette with a remaining tape time of only 5 minutes or so, the display starts blinking about 27 seconds after recording has started.



MAINTENANCE

The **WARNING** indicator shows several different malfunctions by different blinking intervals.

If it blinks with an interval of 0.6 sec,

- there may be something wrong with the tape transport,
or
 - the head drum is not rotating.

If it blinks with an interval of about 1.3 sec

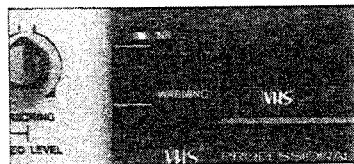
- the tape cannot be unloaded, or
 - the tape end sensor lamp has blown.

If it blinks with an interval of 0.8 sec,

- there is condensation inside the recorder.
 - a tape recorded in the EP mode is played back.

Other warnings

- If tape loading cannot be completed within 5 seconds, tape unloading takes place.
 - If the cassette cannot be ejected within 7 seconds, the eject mechanism stops operating.



SPECIFICATIONS

GENERAL

Format	: VHS 1/2" (12.7 mm) NTSC standard
Power requirement	: AC 120 V~, 50/60 Hz
Power consumption	: 68 watts (Max. 80 watts with the Automatic Editing Control Unit, 12 V DC, 550 mA)
Dimensions	: 44.0(W) x 16.5(H) x 43.0(D) cm (17-1/4" x 6-1/2" x 17") (excluding protrusions)
Weight	: 18.5 kg (41.0 lbs.)
Operating temperature	: 5°C to 40°C (41°F to 104°F)
Storage temperature	: -20°C to 60°C (-4°F to 140°F)
Tape speed	: 33.35 mm/sec (1.31 inches/sec)
Recording & Playback time	: Max. 120 min. with JVC T-120
Fast forward/Rewind time	: Less than 5 min. for 120 min. tape
Wow and flutter	: Less than 0.25 % rms
Search speed	: Shuttle FWD/REV ±10X Variable 0 — ±5X, ±10X

VIDEO

Recording & Playback	: Rotary two-head, helical scanning system Luminance: FM recording Color signal: Phase shift, converted subcarrier direct recording
Video signal system	: NTSC-type color signal (EIA standard)
Input	: Line/TV — 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output	: Line/TV — 1.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio	: 45 dB (Rohde and Schwarz noise meter)
Horizontal resolution	: Monochrome: 300 lines, Color: 240 lines
Sync input	: 4 +0/-3 Vp-p, 75 ohms, unbalanced
Input select	: TV/LINE-1/LINE-2
Sync select	: INT/EXT/VIDEO

AUDIO

Input	Line	: -6/-20 dBs (selectable), 10 k-ohms, unbalanced (CH-1/CH-2)
	Mic	: -70 to -60 dBm, 600 ohms, unbalanced
	TV	: -20 dBs, 10 k-ohms, unbalanced
Output	Line	: -6.0 dBs, low impedance, unbalanced
	Monitor	: 0 dBs, low impedance, unbalanced (CH-1/MIX/CH-2)
	Headphone	: Variable, 8 to 300 ohms, unbalanced
	TV	: 0 dBs, low impedance, unbalanced
Signal-to-noise ratio		: 48 dB (NR-on), 44 dB (NR-off) (at 3 % distortion level)
Frequency response		: 20 to 12,000 Hz
Input select		: TV/LINE 1/LINE 2
Monitor output select		: CH-1/MIX/CH-2

CONNECTORS

Video	Line input/output : BNC-type connectors SYNC input : BNC-type connector TV input/output : EIAJ 8-pin TV connector
Audio	Line input/output : RCA-type pin jacks Mic : 6 mm jacks Monitor out : RCA-type pin jack Headphone : 6 mm jack
	Remote control : 45-pin connector AC in : 3-lead AC connector
	Accessories : Power cord, monitor cable, dust cover

Design and specifications subject to change without notice.

SECTION 1 GENERAL DESCRIPTION

1.1 GENERAL OUTLINE

The VHS system achieves very low tape consumption and uses low cost video cassette tape. Recording time has become 2 hours.

Increased recording time results from the narrow gap video heads, high sensitivity video tape and the slant azimuth recording head configuration which eliminates the need for a guard band between recorded tracks. In addition, the VHS format takes into consideration special operating modes such as still picture, slow motion and speed playback.

Adoption of the VHS format presented several technical challenges. Foremost among these were obtaining high picture quality and high resolution despite the slow (5.9 meters per second) relative speed between the tape and video heads, improving signal to noise ratio (S/N), and preventing black to white reversal phenomena due to the short recording wavelength of 1.2 μm . Also the $\pm 6^\circ$ azimuth angle of the video heads alone is not sufficient to eliminate crosstalk from the lowband converted color signal.

These difficulties were surmounted by selecting both the circuit design and emphasis amount for optimum S/N. The reversal problem was overcome by using a double limiter circuit, while a phase shift system has been designed for eliminating color crosstalk.

The BR-8600U is designed to meet the varied and demanding requirements of institutional video. Special attention has been paid to the critical head drum and tape transport mechanism for heavy-duty use and reliability. Independent DC motors drive the head drum (controlled by drum servo circuit), capstan (controlled by capstan servo circuit) and the reels (controlled by reel servo circuit). In addition, the electrical tape tension control is performed by the reel servo circuit. The aluminum die cast chassis is adopted to support rigorous and heavy-duty use for institutional applications. A motorized front cassette loading system is used for the cassette housing which automatically performs loading and unloading of the cassette. The system control circuit, which employs microprocessor-based full logic control, coordinates the electrical and mechanical functions of the machine to properly implement the various operating modes.

High speed search function is used for quick picture search in both forward and reverse directions at a speed 10 times normal. The key editing feature is that the tape playback speed can be varied continuously from still to 5 times normal in both forward and reverse directions, using a remote control unit (optional). By employing a six-head upper drum, clean one-field still and slow pictures without blur can be played back. Electronic switches select the video bandwidth for color and monochrome. When the input or playback signal is monochrome, higher picture resolution is obtained.

The audio circuit has two audio channels for stereo sound, bilingual applications or audio dubbing. Dolby* noise reduction is included for improved sound quality. For more elaborate editing, direct interfacing with JVC's Automatic Editing Control Unit is possible.

The following discussion covers several main points of the VHS format.

* Dolby is a trademark of Dolby Laboratories.

1.2 MAGNETIC TAPE PATTERN

1.2.1 Standard

In the VHS format, two rotating video heads at $\pm 6^\circ$ azimuth angle are used for recording without a guard band. Fig. 1-1 indicates the recording pattern, while the pertinent values are listed in Table 1-1.

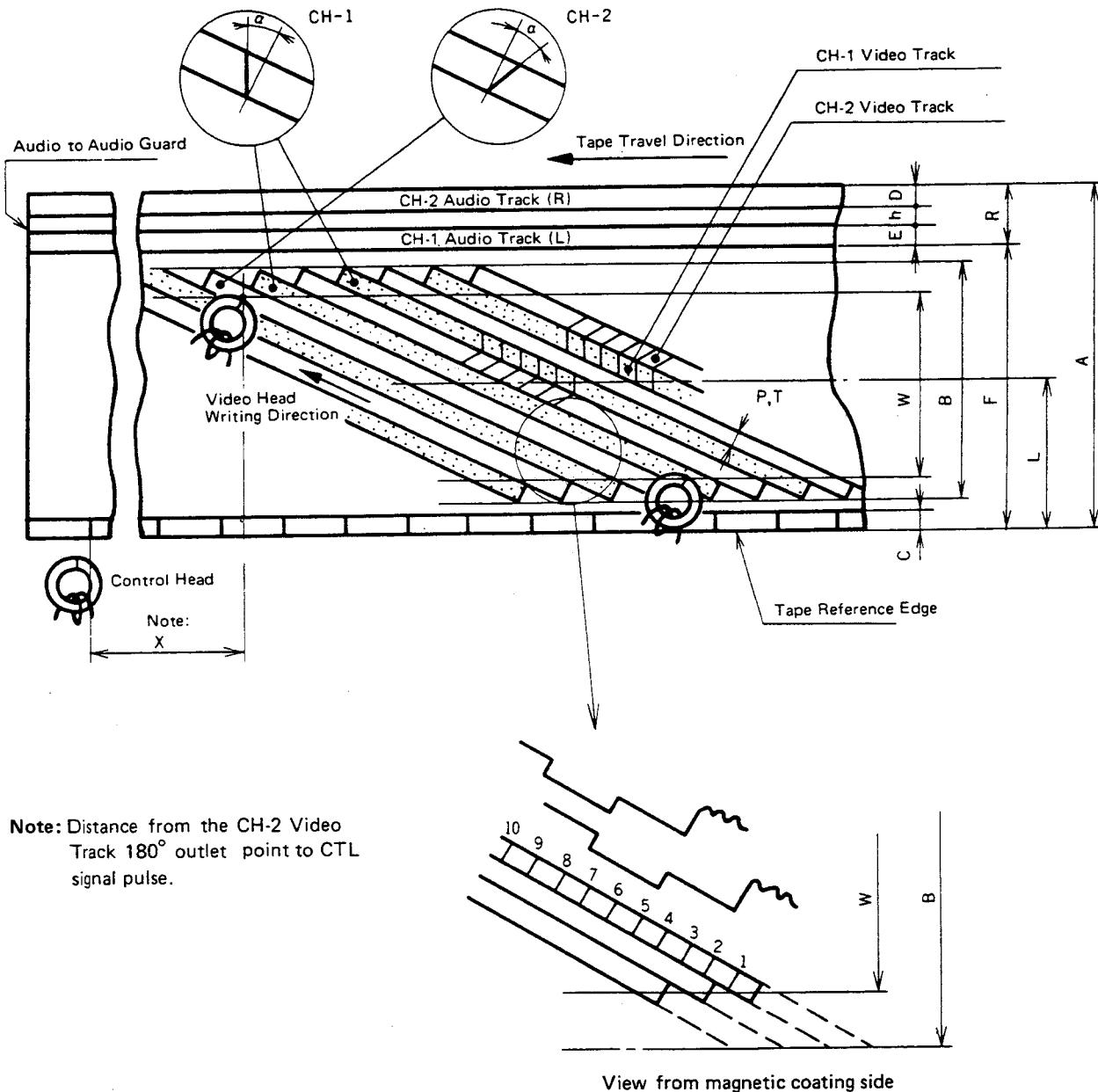


Fig. 1-1 Magnetic tape pattern

Items	Standard	Remarks
1. (A) Tape Width	mm	12.65 ± 0.01
2. (Vt) Tape Speed	mm/sec	$33.35 \pm 0.5\%$
3. (ϕ) Drum Diameter	mm	62 ± 0.01
4. (Vh) Writing Speed	m/sec	5.80
5. (P) Video Track Pitch	mm	0.058
6. (B) Total Video Width	mm	10.60
7. (W) Video Effective Width	mm	10.07
8. (L) Video Track Center	mm	6.2
9. (T) Video Track Width	mm	0.058
10. (C) Control Track Width	mm	0.75
11. (R) Audio Track Width	mm	1.0
12. (D) Audio Track Width	mm	0.35
13. (E) Audio Track Width	mm	0.35
14. (F) Audio Track Reference Line	mm	11.65
15. (h) Audio to Audio Guard Width	mm	0.3
16. (θ_0) Video Track Angle		$5^{\circ}56' 7.4''$
17. (θ) Video Track Angle		$5^{\circ}58' 9.9''$
18. (α) Video Head Gap Azimuth Angle		$6^{\circ} \pm 10'$
19. (X) Positions of Audio and Control Heads	mm	79.244
20. () Positions of Front Edge of V-SYNC		5 ~ 8H
21. () Tape Back-Tension		30 ~ 45 g
		Inside the W bottom edge At the tape beginning and the drum entrance

Table 1-1 Magnetic tape pattern

Note: Tests and measurements shall be made under the following conditions.

Temperature: $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$, Relative humidity: $65\% \pm 5\%$

However, unless essential to the judgement, these can also be done under the following conditions.

Temperature: $5 \sim 35^{\circ}\text{C}$, Relative humidity: $40 \sim 80\%$

1.2.2 Horizontal correlation

The azimuth head configuration removes crosstalk from most of the high frequency portion of the FM luminance signal, however, it is not able to fully eliminate crosstalk from the low frequency component of the lower sideband portion. This residual crosstalk is reduced by employing line correlation for the tape pattern.

Line correlation (or "H correlation") consists of arranging the horizontal sync signal positions of adjacent recorded tracks. Since this makes the frequencies of the main signal and crosstalk signal very close, the demodulated crosstalk amount becomes extremely low with

respect to the main signal. The type of H correlation used in the VHS format is shown in Fig. 1-2.

In order to provide H correlation in the tape pattern, tape speed, head drum diameter and other factors must be decided. The adjacent track correlation in the VHS format is 1.5 H. This 1.5 H difference is important for removing low frequency crosstalk from the luminance signal.

Another advantage of H correlation is in avoiding skew distortion effects during special operating modes such as still, slow motion, 2x speed and shuttle search, when each video head traces two or more tracks. In these modes, the horizontal sync signals become played back at fixed intervals.

Note: The recording pattern of 6-hour extended mode satisfies the horizontal correlation.

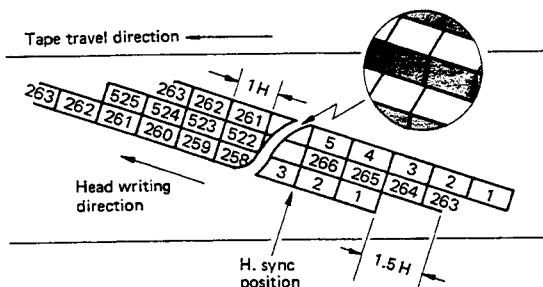


Fig. 1-2 VHS recording signal pattern

1.3 LUMINANCE SIGNAL RECORDING SYSTEM

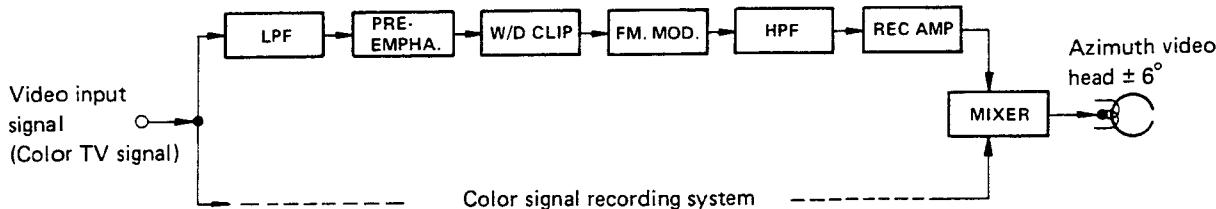


Fig. 1-3 Luminance signal recording system

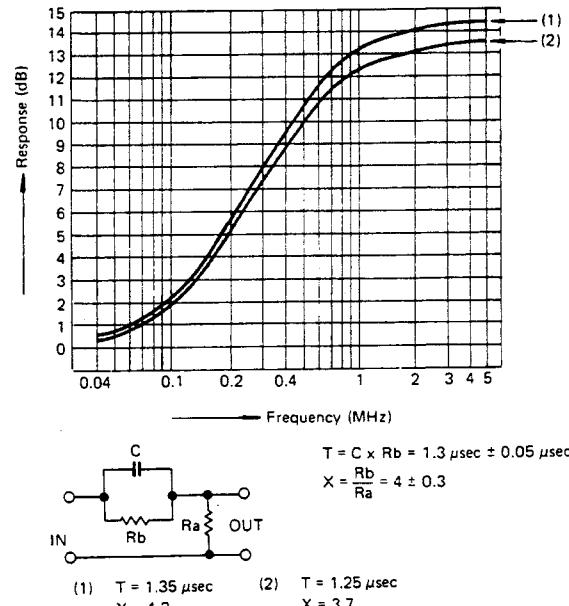
Frequency modulation (FM) is used for the luminance signal recording system. A simplified block diagram of the system is shown in Fig. 1-3.

A lowpass filter (LPF) removes the color component and passes only the luminance component of the input color TV signal. At the next stage pre-emphasis circuit, the high frequency portion of the luminance signal is enhanced in order to improve S/N during FM recording. Since excess pre-emphasis could lead to black/white reversal due to the shortened recording wavelength, a white/dark clip circuit cuts the overshoot and undershoot components which exceed certain positive and negative levels.

The frequency modulator (FM MOD) converts the luminance signal to FM, which goes through a highpass filter (HPF) to the recording amplifier. These circuits amplify the signal with the proper frequency characteristic, after which it is mixed with the down converted color signal and supplied to the video heads.

the luminance signal, with a bandwidth of from about 30 Hz to 3.0 MHz, is used. With some VHS models, when the input is a black and white TV signal, it bypasses the LPF, allowing a wider bandwidth to beyond 4.2 MHz.

1.3.2 Pre-emphasis characteristics



1.3.1 Luminance signal recording frequency characteristic (LPF)

As shown in Fig. 1-4, when the video input is a color TV signal, a lowpass filter removes the color component and

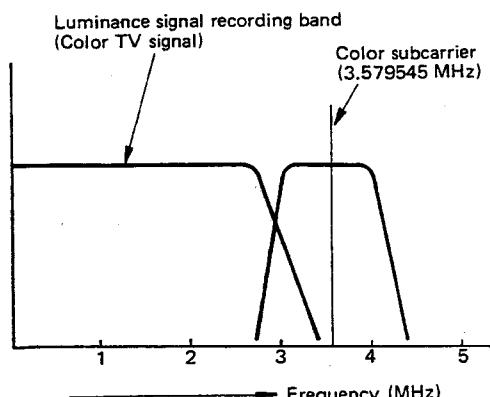


Fig. 1-4 Luminance signal recording band

1.3.3 White and dark clip level (See Fig. 1-6.)

White clip level : $185 \pm 5\%$ measured from sync tip

Dark clip level : $50 \pm 5\%$ measured from sync tip

Note: The level from sync tip to white peak is 100%.

1.3.4 FM carrier frequency and deviation (See Fig. 1-6.)

Sync tip : 3.4 ± 0.05 MHz

White peak : 4.4 ± 0.05 MHz

Deviation : 1.0 ± 0.05 MHz

1.3.5 FM signal recording frequency (HPF)

As indicated in Fig. 1-6, when the video input is a color TV signal, it goes through an HPF for vacating the area for the down converted color signal. With some VHS models, when the input is a B/W TV signal, the HPF can be bypassed to extend the bandwidth to the DC area.

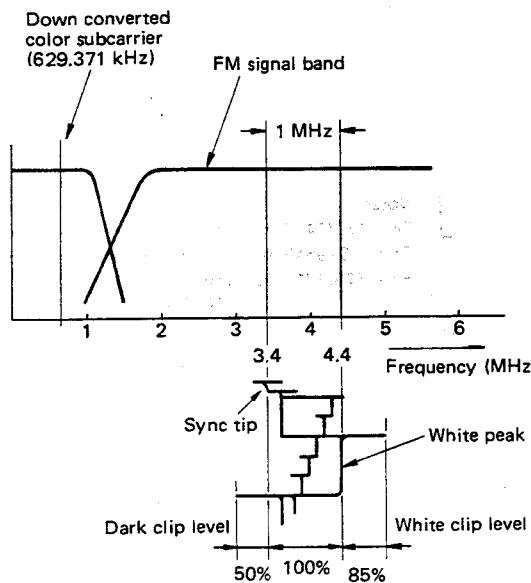


Fig. 1-6 Recording spectrum

1.4 LUMINANCE SIGNAL PLAYBACK SYSTEM

This system functions to return the signals recorded on the tape to a form as close as possible to the video input signals. The simplified block diagram is shown in Fig. 1-7.

The low level FM signals played back by the two video heads are combined into a single FM signal by the switching amplifier. After amplification to the required frequency characteristic, a highpass filter attenuates the down converted color signal and passes only the FM luminance signal. This HPF has the same response as that of the recording system.

1.3.6 FM signal recording amp. characteristics (REC AMP)

Current:

More than 3.8 MHz	: Optimum saturation recording current
2 MHz	: 3 ± 1 dB
1 MHz	: 6 ± 1 dB
Less than 1 MHz	: Flat characteristics

Note: 0 dB at 3.8 MHz

1.3.7 FM signal head current (VIDEO HEAD)

Specified to be within ± 1.5 dB of 4 MHz optimum recording current.

Variations in the playback FM signal level due to mechanical stretching and contraction of the tape, and irregularities in tape to head contact, are corrected by the limiter circuit. The signal is amplified more than 80 dB to permit precise demodulation. A double limiter circuit is employed in order to prevent black/white reversal effects.

In the following stages, the demodulator and lowpass filter return the luminance signal to its AM form. The de-emphasis circuit reverses the emphasis applied during recording. From this point, the signal goes to the mixer where it is mixed with the playback color signal to become the video output signal.

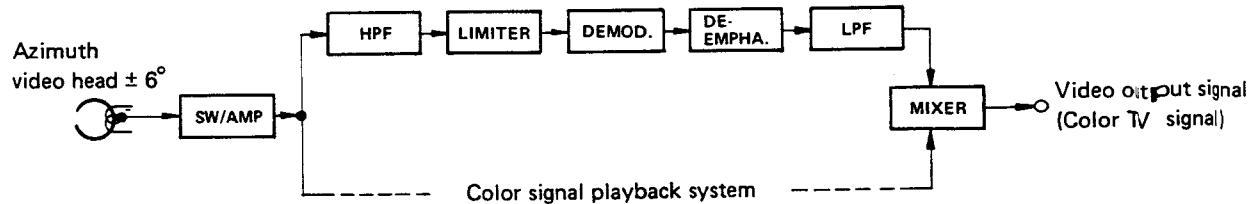


Fig. 1-7 Luminance signal playback system

1.5 COLOR SIGNAL RECORDING SYSTEM

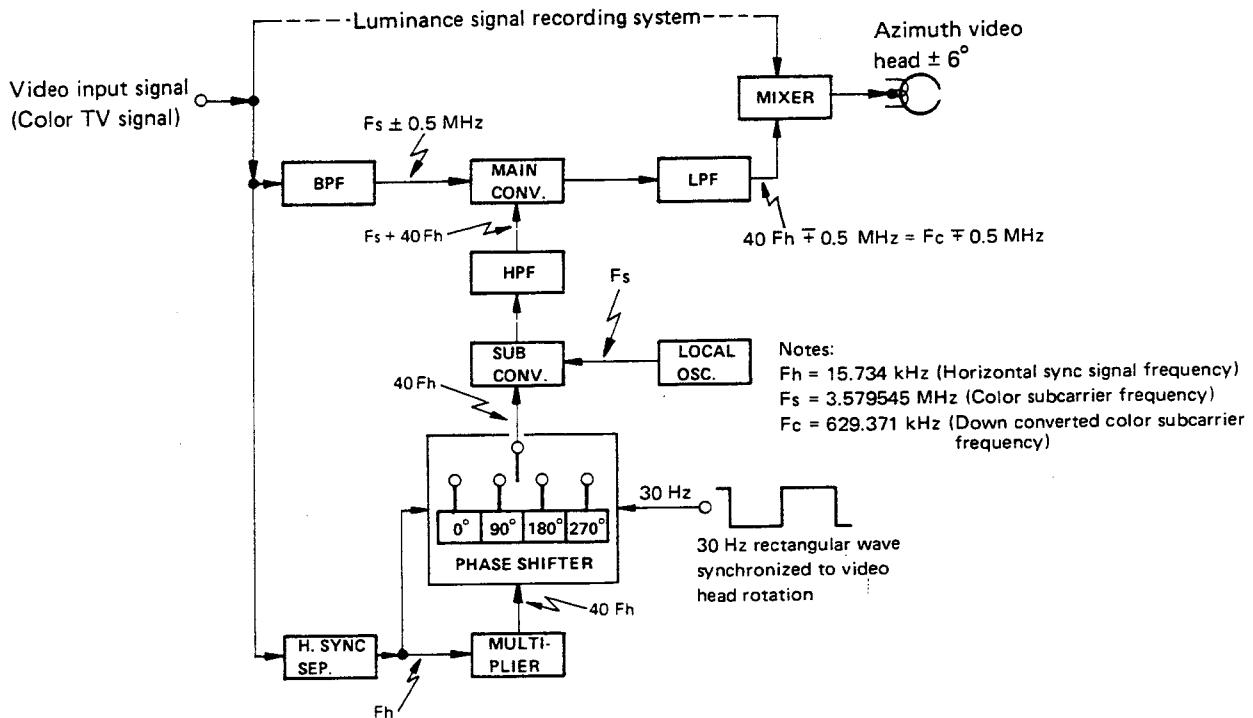


Fig. 1-8 Color signal recording system

This is a direct recording system using a down converted phase shifted color signal. The phase shift system removes color crosstalk which cannot be completely eliminated by the azimuth video heads. Fig. 1-8 illustrates a simplified block diagram of this system.

A bandpass filter (BPF) extracts the color component from the input video signal and supplies it to the main converter.

At the same time, the input signal also goes to the horizontal sync separator, which supplies the 15.734 kHz (F_h) to the multiplier and phase shift circuits. Via the phase shifter, the 40 Fh CH-1 track component is advanced in phase each line (1 H) and supplied to the sub converter, while the CH-2 component is delayed in phase 90° every line (1 H). A 30 Hz rectangular wave synchronized to the video head rotation is used for differentiating between the CH-1 and CH-2 components. Each line is also controlled by the F_h input.

The local oscillator produces the color subcarrier frequency 3.579545 MHz (F_s). At the sub converter, the goes to the sub converter. At the sub converter, the 40 Fh and F_s are frequency converted to become ($F_s + 40 F_h$). This is supplied through a highpass filter to the main converter. Also supplied to the main converter

are the color signal $F_s \pm 0.5 \text{ MHz}$ and carrier wave ($F_s + 40 F_h$). These are down converted to become (40 Fh ± 0.5 MHz) which through a lowpass filter goes to the mixer for mixing with the FM luminance signal. The result is applied to the video heads.

In other words, the 3.579545 MHz (F_c) color subcarrier is converted to a low band of 629.371 kHz (40 Fh). The down converted color signal is then recorded directly using the FM luminance signal as AC bias.

1.5.1 Color crosstalk correction by phase shift system

While the CH-1 track component is advanced 90° every line and recorded, the phase of the CH-2 track component is delayed 90° every line. Fig. 1-9 illustrates the principle of this phase shift system.

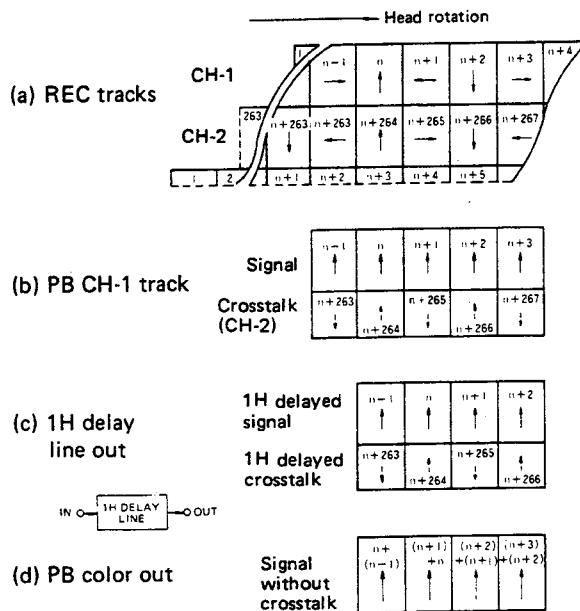


Fig. 1-9 Phase shift system

In the figure, (a) indicates the phase shifted recording pattern. The CH-1 head pattern phase is advanced 90° every line. The phase of the CH-2 head pattern is delayed every line.

During playback, when the CH-1 head picks up a portion of the CH-2 track signal, this becomes the crosstalk component. The main signal is delayed 90° every line from the CH-1 track, and this output is shown by (b). The dotted arrows indicate the crosstalk component and, as can be noted, the phase reverses every line.

Passing signal (b) through a 1 H delay line yields signal (c). In comparing signals (b) and (c), the main signal phase is the same every line, but the crosstalk phase reverses. Therefore, by mixing signals (b) and (c), the crosstalk component of the adjacent track can be removed to result in the playback color signal (d).

In other words, the signal is recorded by the phase shift system and during playback, it is mixed with the signal through a 1 H delay line to remove crosstalk.

Crosstalk in the playback color signal (d) effectively becomes zero, while the main signal is enhanced to improve S/N. Also, the CH-2 head playback phase is advanced 90° every line (opposite to recording), producing the same effect. A digital type system is used for phase shifting.

1.5.2 Down converted color subcarrier frequency

The color subcarrier frequency (F_s) can be expressed as:

$$F_s = 1/2F_h \times n \quad (n = \text{odd number: } 455)$$

$$= 3.579545 \text{ MHz}$$

A frequency interleaving system (line offset system) is used. This avoids serious color noise when the color signal is displayed on a monochrome TV receiver.

Fig. 1-10 shows this color signal spectrum.

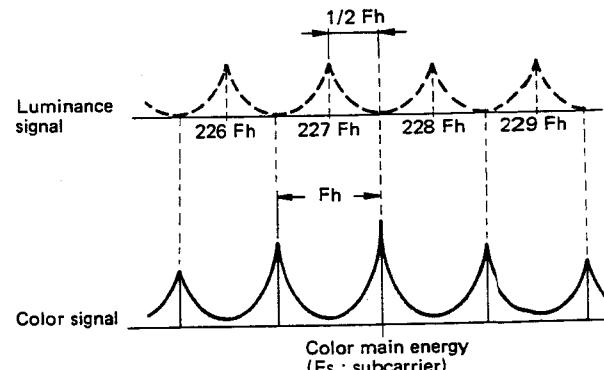


Fig. 1-10 Spectrum of color signal

In the phase shift system, the CH-1 component of the down converted color signal is advanced in phase 90° every line, deviated by plus 1/4 Fh, and distributed at 1/2 Fh intervals centered on the Fc (down converted color subcarrier) component. The CH-2 track component is delayed in phase 90° every line, deviated by minus 1/4 Fh, and distributed at 1/2 Fh intervals centered on Fc. This spectrum is shown in Fig. 1-11.

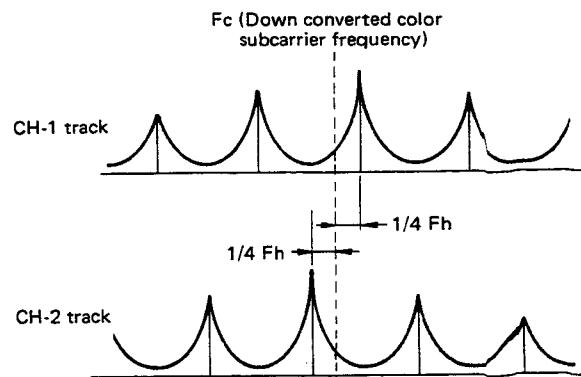


Fig. 1-11 Spectrum of down converted color signal

The FM luminance and down converted color signals are mixed to become the recording current. When recorded and played back using magnetic tape, which possesses 3-dimensional distortion and nonlinearity, interference in the form of $F_o + 2F_{DC}$ (F_o : FM carrier; F_{DC} : down converted color signal) becomes introduced and cannot be ignored. When the $2F_{DC}$ component is detected and demodulated, beat becomes produced with respect to the luminance signal and appears in the picture. Therefore, as with the color signal, F_c (down converted color subcarrier frequency) must be selected so that the frequency of the $2F_{DC}$ component becomes interleaved (1/2 offset) in relation to the luminance signal.

When F_c is determined at 40 Fh, the $2F_{DC}$ spectrum of the CH-1 track component appears at $(+1/2 F_h)$ and in the CH-2 track distribution, the $2F_{DC}$ spectrum appears at $(nF_h - F_h)$.

Fig. 1-12 shows the $2F_{DC}$ component spectrum with respect to the playback luminance signal at this time.

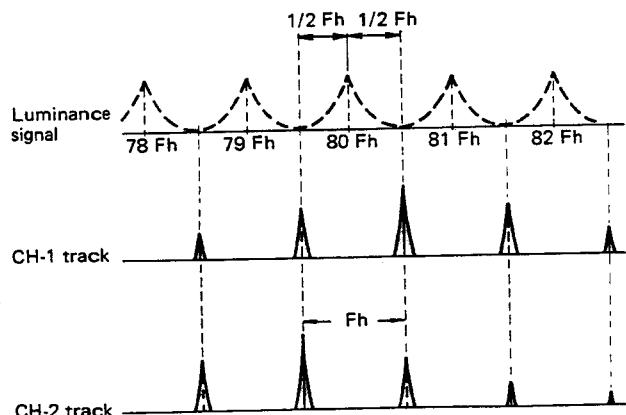


Fig. 1-12 2F_{DC} playback spectrum

The $2F_{DC}$ components for both CH-1 and CH-2 become interleaved (1/2 line offset) with respect to the luminance signal and thereby visually reduced. The 629.371 kHz value was selected for both reducing noise and in consideration of color bandwidth.

1.5.3 Color signal recording bandwidth

Response curves for the bandpass and lowpass filters are indicated in Fig. 1-13.

Constant current characteristics are possessed by the down converted color signal recording current.

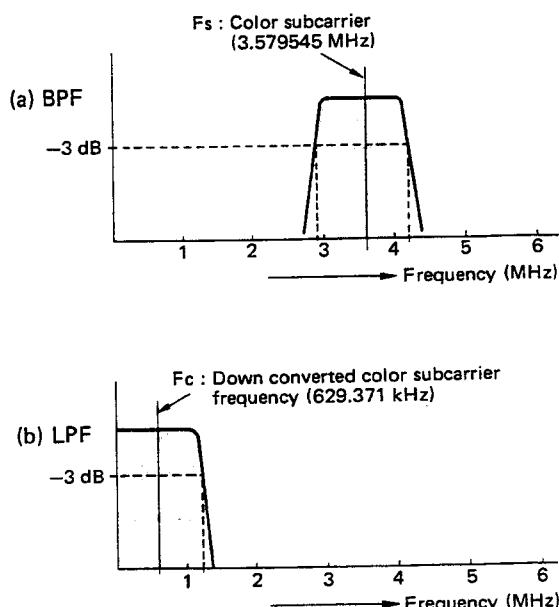


Fig. 1-13 Color signal recording bandwidth

1.6 COLOR SIGNAL PLAYBACK SYSTEM

The color signal playback system performs essentially the opposite function as the recording system. In addition, however, important corrections must be performed for color signal frequency and phase errors introduced by variations in tape speed and head rotation, and elasticity of the tape.

Fig. 1-14 indicates an abbreviated block diagram of this system.

Though a lowpass filter, the down converted color signal goes to the main converter. At this time, the down converted color subcarrier (F_c) contains an error component ($40 F_h' \pm \Delta f$) due to mechanical factors of the heads and tape. F_h' varies with the tape speed as $F_h \pm \Delta F_h$. Δf is the instantaneous error caused by head rotation irregularities and tape elongation and contraction.

The $40 F_h'$ frequency deviation component is compensated by supplying the video output signal to the horizontal sync separator, multiplier and phase shifter, and $40 F_h'$ to the sub converter. This forms the AFC (automatic frequency compensator) loop.

In the APC (automatic phase compensator) loop, the $\pm \Delta f$ phase error component is compensated by comparing the burst component of the up converted playback color signal with the subcarrier frequency from the local oscillator and APC detector. A variable crystal oscillator (VXO) produces ($F_s \pm \Delta f$) which goes to the sub converter. As a result, ($F_s + 40 F_h' \pm \Delta f$) is supplied as the main converter carrier input from the sub converter through a highpass filter.

By frequency conversion with F_c , the color subcarrier frequency of 3.579545 MHz, which is free from frequency and phase deviations, becomes obtained through a bandpass filter. In the opposite manner as with recording, the phase shifter delays the CH-1 track phase 90° every line, advances the CH-2 track phase 90° every line and $40 F_h'$ is supplied to the sub converter. The playback color signal through the main converter and bandpass filter is applied to a 1 H delay line for removing crosstalk. Characteristics of the lowpass and bandpass filters are the same as those for recording (Fig. 1-13).

At the mixer, the playback color and luminance signals are mixed to become the video output signal.

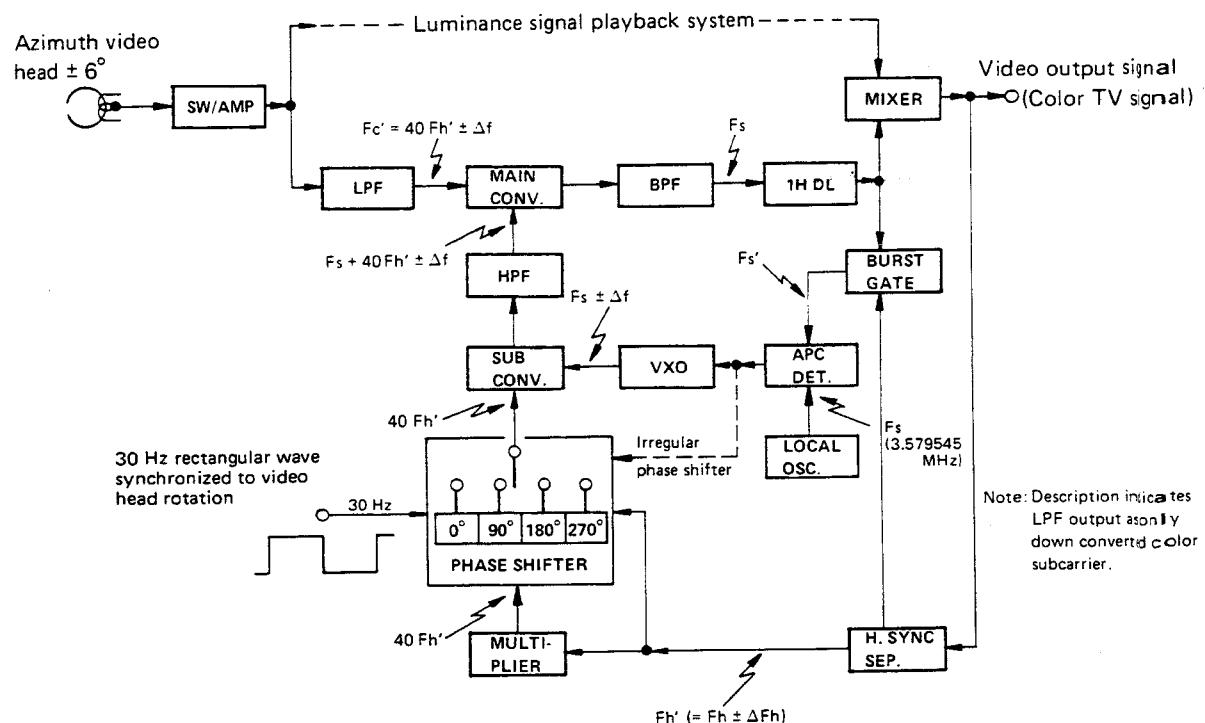


Fig. 1-14 Color signal playback system

1.7 CONTROL SIGNAL RECORDING SYSTEM

Control signal waveform, polarity and video head relationships are indicated in Fig. 1-15. Phase of the control signal is the same as the vertical sync signal rise component of the CH-1 track. The positive pulse voltage is the reference 30 Hz.

The control signal is recorded on the control track above the saturation recording level.

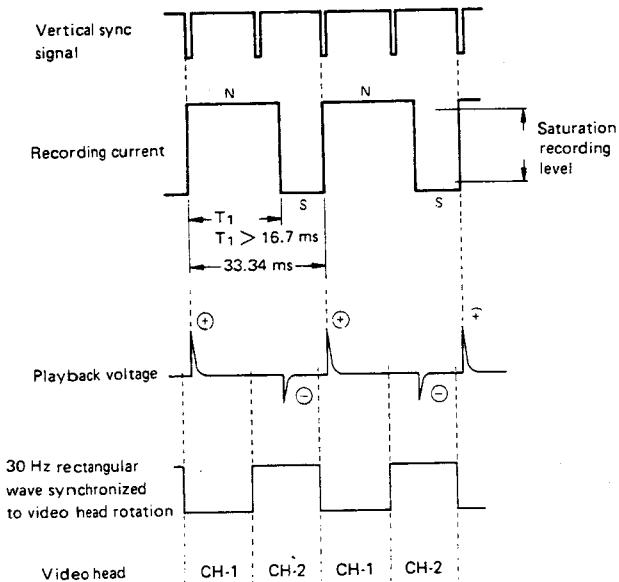


Fig. 1-15 Control signal

1.8 AUDIO SIGNAL RECORDING SYSTEM

1.8.1 Audio signal recording level

Audio signal is recorded on the audio track to the defined level using an AC bias current recording system.

1.8.2 Audio signal recording current characteristics

The equalizing amplifier controls the recording current in order to obtain a flat frequency characteristic in the reproduced output. See Fig. 1-16.

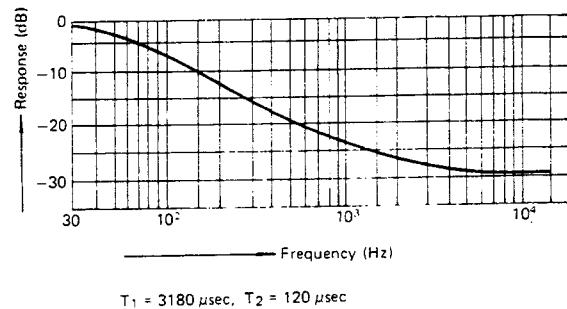


Fig. 1-16 Audio equalizing frequency characteristics

1.9 CASSETTE

1.9.1 Video tape

Length : The relationship between tape length and time for recording and playback can be defined by the formula:

$$L = [2.02t + 2]^{+3}_0$$

where, L : tape length (m)

t : recording or playback time (minutes)

Note: L shall be an integer obtained after all decimals produced in calculation are raised. (See "Reference Table".)

Width : 12.65 ± 0.01 mm

Fluctuation : less than 6 μ m

Thickness : 19^{+1}_{-2} μ m

Coercivity : 600 oersted class (nominal)

Optimum recording current shall not differ from the standard tape.

[Reference Table]

Kinds of blank cassettes

Kind of cassette	Recording or playback time	Length of video tape
T-120	120 min.	246^{+3}_0 m
T-90	90 min.	185^{+3}_0 m
T-80	80 min.	165^{+3}_0 m
T-60	60 min.	125^{+3}_0 m
T-40	40 min.	84^{+3}_0 m
T-30	30 min.	64^{+3}_0 m
T-20	20 min.	44^{+3}_0 m

1.9.2 Leader tape and Trailer tape

Length : In case time for recording or playback is:

over 60 minutes : 170 ± 20 mm

just or under

60 minutes : 150 ± 20 mm

Width : 12.65 ± 0.03 mm

Thickness : 40^{+5}_{-25} μ m

Material : Polyester film

Transparency : more than 50%

Length of splicing: 12 ~ 19 mm

Gap of splicing : 0 ~ 70 μ m

Splicing force : more than 3 kg

1.9.3 Reel

Outside diameter : 89 ± 0.2 mm

Hub diameter : In case time for recording or playback is:

over 60 minutes : 26 ± 0.15 mm

just or under

60 minutes : 62 ± 0.2 mm

(If just or under 30 minutes, it can be

70 ± 0.2 mm.)

E-value : more than 1.5 mm

1.9.4 Simplified illustrations

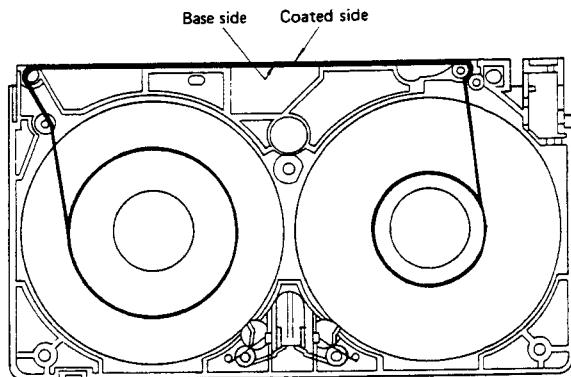


Fig. 1-17 Tape winding and tape path

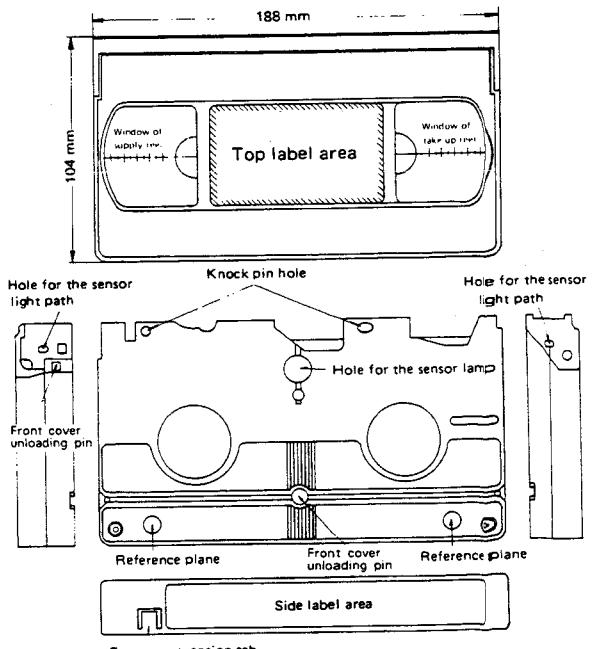


Fig. 1-18 Cassette appearance

SECTION 2

MECHANICAL ADJUSTMENT

2.1 GENERAL

The adjustments described in this section are those which can be performed by a qualified service technician. Those which require highly specialized equipment and training are omitted.

Proper maintenance and inspection are important both for ensuring top performance and preventing damage to the tape. Note that the required jigs must be employed when specified in the adjustment steps.

2.1.1 Precautions

- **IMPORTANT**

1. Always turn the power off before removing or soldering components.
2. When removing a screw from the chassis, be careful not to drop it into the mechanism. If a screw should be dropped, be sure to retrieve it.
3. Be extremely careful not to damage either the upper or lower head drum assemblies.
4. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.

5. When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the guide poles and rotary video head drum.)
6. To check the mechanism without the cassette tape, disable the photo transistor sensors by covering them with opaque material. After completing checks and repairs, be sure to remove the covers.
7. Place a suitable weight on the cassette when operating without the housing.
8. To open the protective door of the cassette, press the small locking tab at the upper right corner of the cassette and open the hinged door manually. Since the tape becomes exposed, use care not to damage or soil it.

2.1.2 Required jigs and tools

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary.

In addition, general-purpose tools and a set of metric hex keys (not supplied by JVC) are required.

The hex keys needed for this model are 1.5 and 2.4 mm in size.

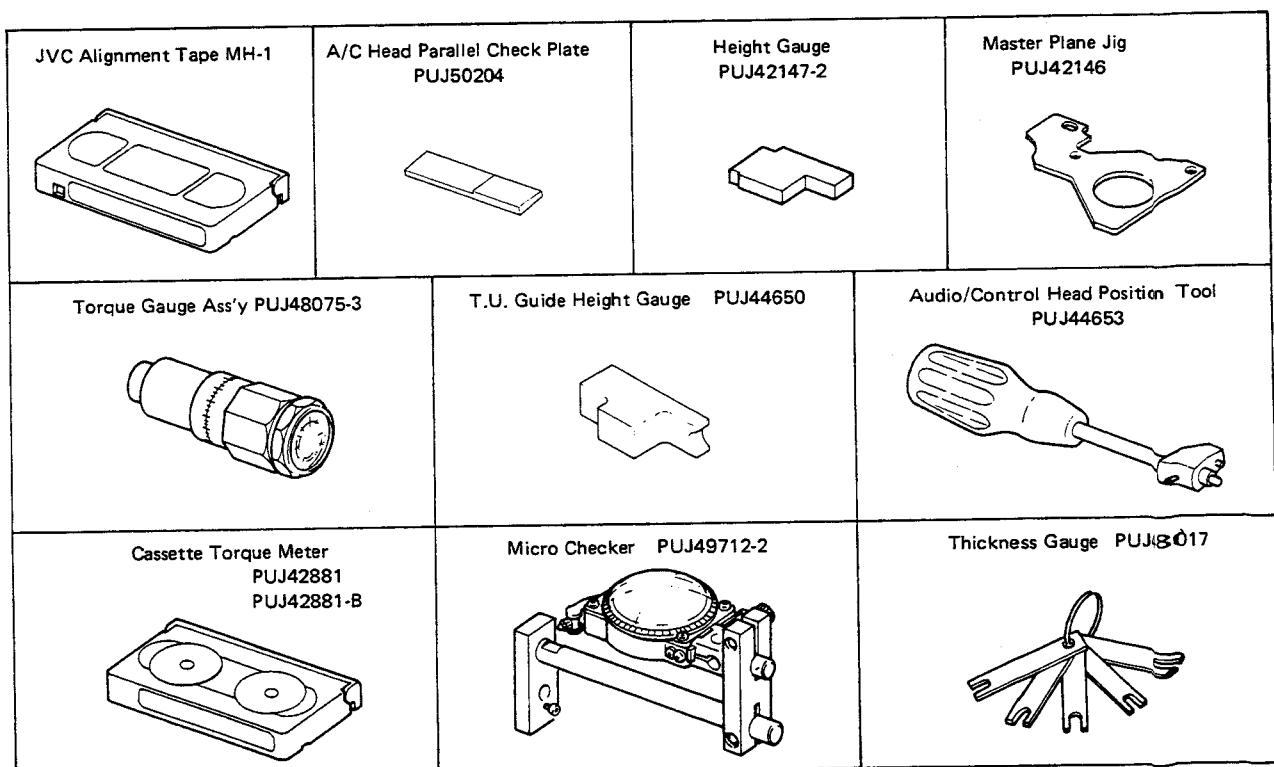


Fig. 2-1 Jigs and tools

2.2 LAYOUT OF MAIN MECHANICAL PARTS

[A] : Top view and Parts identification

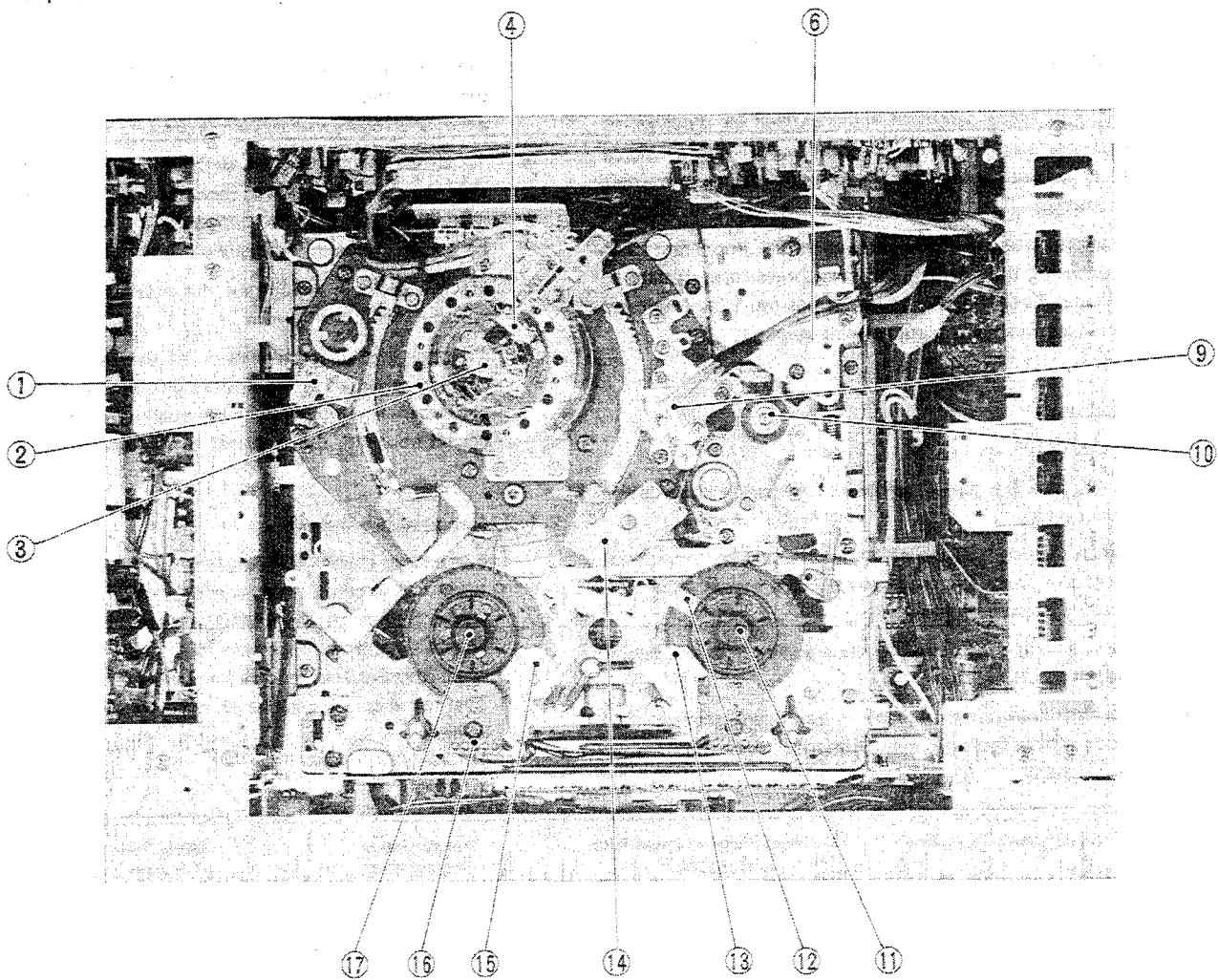


Fig. 2-2(a) Top view

Symbol No.	Part No.	Part Name	Description
1	PU54397	Full Erase Head	
2	PUS36743A	Upper Drum Ass'y	
3	PGZ00021-1-1	Slip Ring Ass'y	
4	PUS46507A	Brush Sub Ass'y	
5	—	—	
6	PGZ00093	Pinch Roller Solenoid	
7	—	—	
8	PGZ00014	Power Transformer	
9	PGZ00025	Audio/Control Head Ass'y	
10	PQ40137A	Pinch Roller Holder Ass'y	
11	PGZ00094	Take-up Reel Disk Ass'y	
12	PU50547A	B.T. Lever Ass'y	
13	PU50535B	Take-up Main Brake Ass'y	
14	GL-450	Cassette LED	
15	PU50535A	Supply Main Brake Ass'y	
16	PU55701	Supply Photo Interrappter	
17	PGZ00095	Supply Reel Disk Ass'y	

Table 2-1

[B] : Bottom view and Parts identification

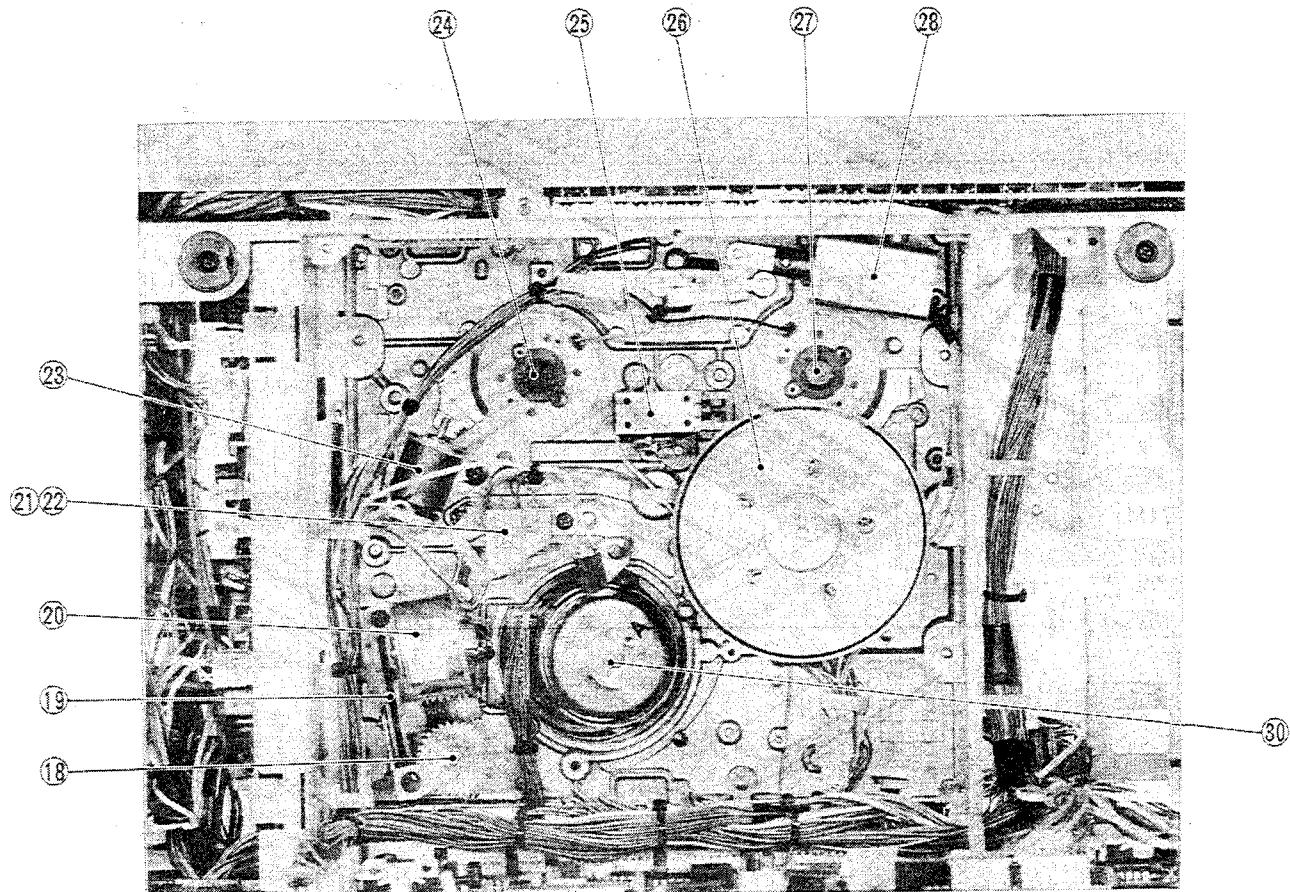


Fig. 2-2(b) Bottom view

Symbol No.	Part No.	Part Name	Description
18	PGZ00032A	Loading Drive Gear Ass'y	Incl. (19) and (20)
19	PU50350	Loading Belt	
20	PU52745A	Loading Motor Ass'y	
21	QSM1S11-201	A.L. Switch	
22	" -201	U.L. Switch	Chassis side
23	PGZ00031	Differential Transformer Ass'y	
24	PU50531-2	Supply Reel Motor	
25	PGZ00091	L.T. Solenoid	
26	PGZ00026	Capstan Motor	
27	PU50531	Take-up Reel Motor	
28	PGZ00092	Brake Solenoid	
29	-	-	
30	PUS26687B-4	Lower Drum Ass'y	

Table 2-2

2.3 DISASSEMBLY

[A] : External covers

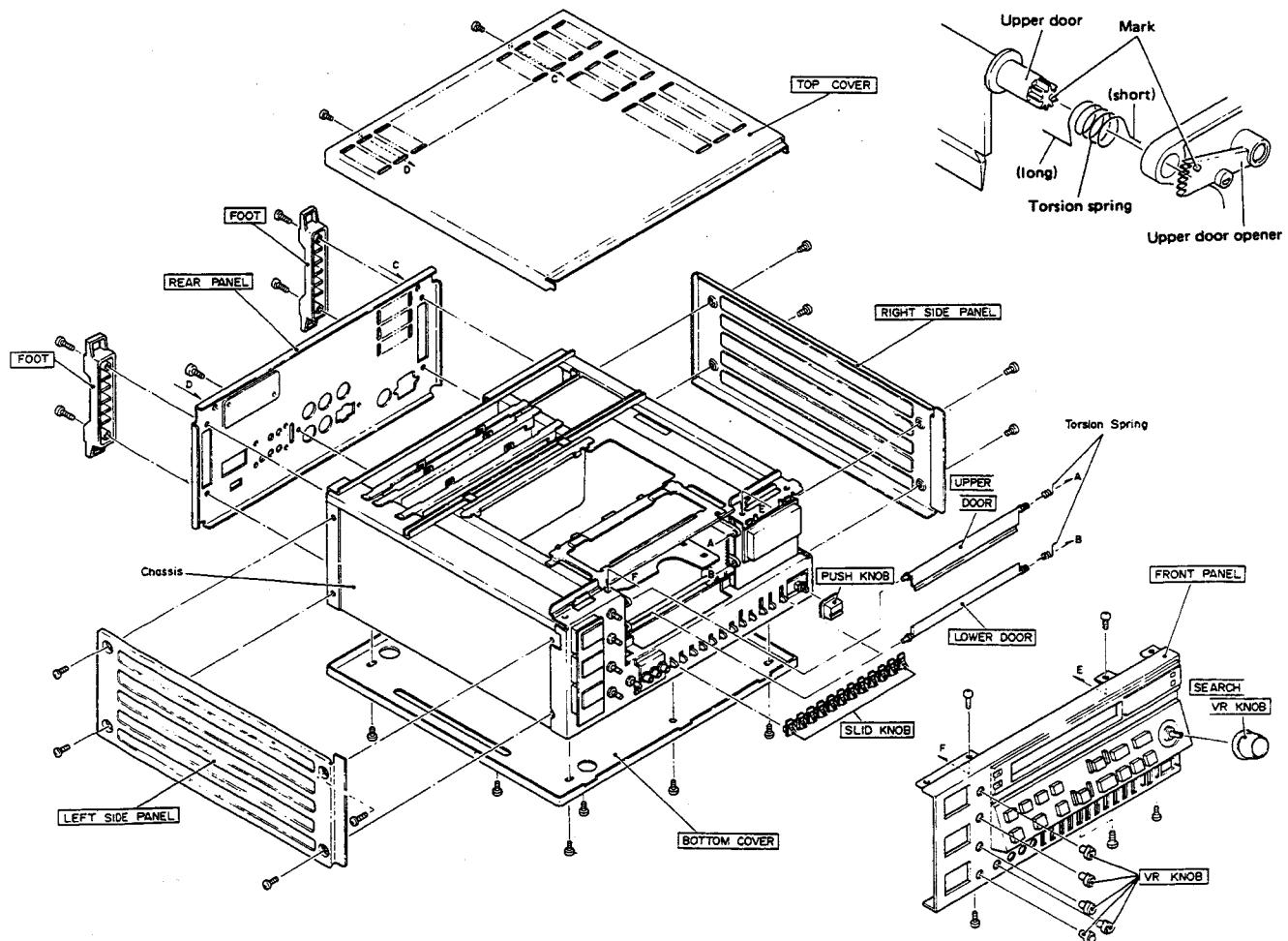


Fig. 2-3(a) External covers

- Top cover
 1. Take out two screws and move the top cover in the arrow direction to remove it.
- Front cover
 1. Remove the top cover.
 2. Take out five screws and move the front cover in the arrow direction to remove it.
- Bottom plate
 1. Take out six screws and move the bottom plate in the arrow direction to remove it.
- Rear panel
 1. Remove the top cover.
 2. Take out five screws and move the rear panel in the arrow direction to remove it.
- Upper door and Lower door
 1. Remove the front cover.
 2. Move the lower door in the arrow direction to remove it. Use care regarding the torsion spring.
 3. In the same manner, move the upper door in the arrow direction to remove it. Use care regarding the torsion spring.
 4. When reassemble the doors, perform the following:
 - 1) Observe the upper door and recognize the mark on the gear portion.
 - 2) Set the long straight part of the torsion spring toward the upper door.
 - 3) Install the upper door in the state with the mark corresponding with the mark of the upper door opener on the cassette housing.
- Right and Left side panel

Take out two screws and move the side panel in the arrow direction to remove it.

[B]: Circuit board assemblies

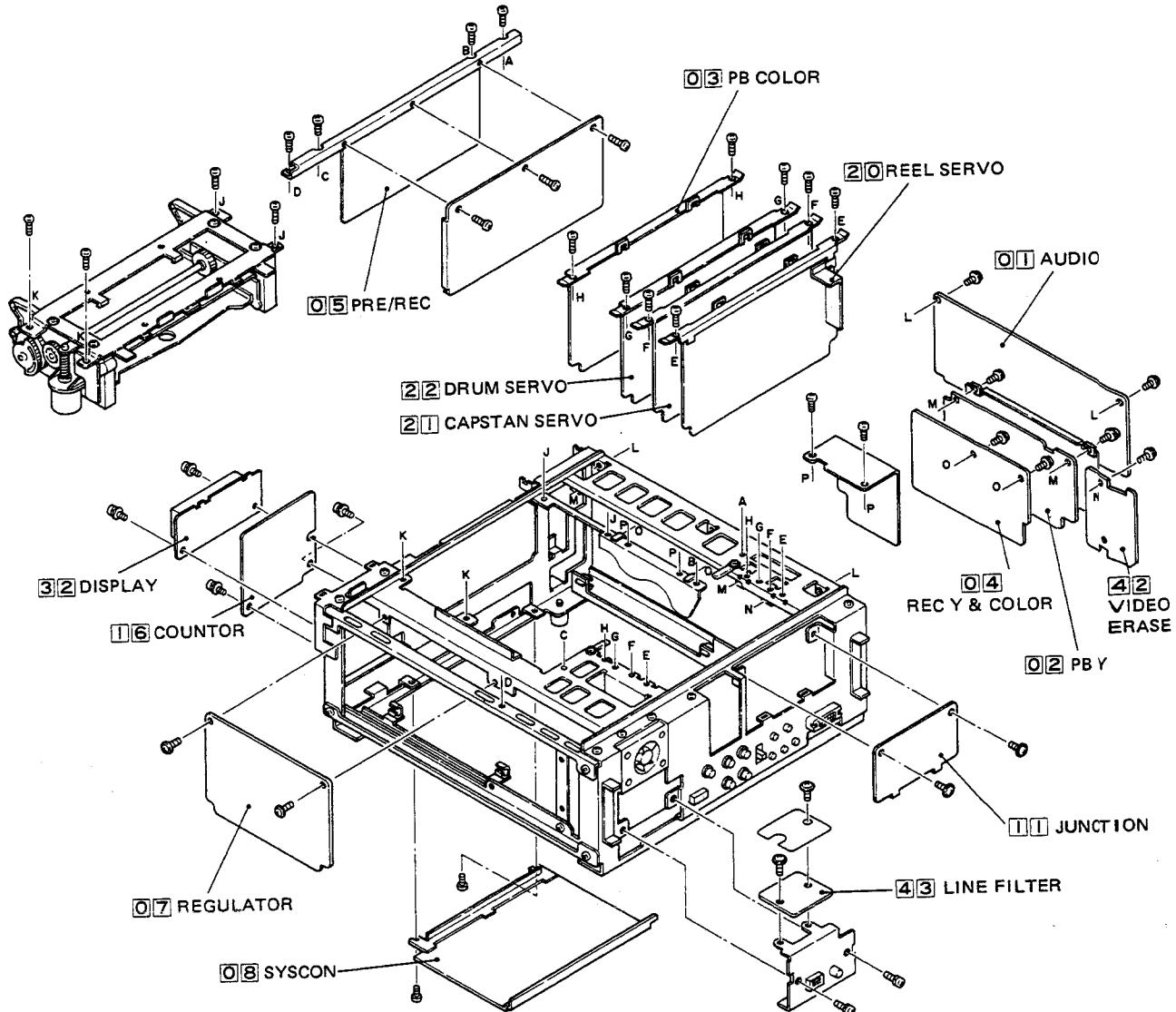


Fig. 2-3(b) Circuit boards

2.4 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

2.4.1 Cleaning

- For cleaning parts except the video heads, use gauze or lint-free cloth dampened with alcohol.
- When cleaning the portions of the upper and lower drums which contact the video tape, use a lint-free cloth moistened with alcohol. Avoid touching the video heads while performing this.
- When cleaning the video heads on the upper drum, use one hand to hold the upper drum still. With a lint-free cloth moistened in alcohol, very gently wipe the video heads with a side to side motion.
- When cleaning rubber and plastic parts, avoid using excessive alcohol since it may accelerate deterioration of these parts.

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IMPORTANT:

Do not wipe the video heads with an up and down motion, as this may dislodge the video heads.

- After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.

2.4.2 Periodically replaced parts

The replacement periods of the parts shown in Table 2-3 are typical for equipment that is used in accordance with the instruction manual. Note that the times may vary considerably according to environmental and usage conditions. As a rule, inspect these components whenever performing major service on the machine and replace those which show obvious signs of wear or deterioration.

PART NAME	OPERATING HOURS									
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Tension pole										
Supply slant pole										
Supply guide roller										
Supply guide pin										
Supply guide pole										
Supply impedance roller										
Tape guide	C	C	C	C	C	C	C	C	C	C
Capstan										
Take-up guide roller										
Take-up slant pole										
Supply brake										
Take-up brake										
Full erase head	C	C	C	C	C	C	C	C	C	R
Audio/Control head ass'y	C	C	C	R	C	C	C	C	C	C
Upper drum ass'y	C	R	C	R	C	R	C	R	C	R
Pinch roller	C	C	C	R	C	C	C	R	C	C
Supply reel motor				R				R		
Take-up reel motor				R				R		
Capstan motor ass'y						R				
Cassette housing motor										R
Loading motor										R
Loading motor pulley				C		C		C		C
Loading gear pulley				C		C		C		C
Supply reel disk rubber tire				R		C		R		C
Take-up reel disk rubber tire				R		C		R		C
Loading belt				R		C		R		C
Brush sub ass'y		R		R		R		R		R
Slipring ass'y		R		R		R		R		R

Note: Upper drum life is influenced by the operating conditions.

Key to abbreviations: C : Cleaning

R : Replacement

Table 2-3 Periodic maintenance

2.5 MAIN ASSEMBLY REPLACEMENT

As necessary to allow replacement, remove external covers, circuit boards, shield covers, cassette housing, etc.

2.5.1 Cassette housing and cassette motor

Note: Avoid operating the slide plate within with fingers, etc. when dismounting the cassette housing without using a cassette. Danger is involved when the reinforcement touches the roof plate at the time of cassette loading.

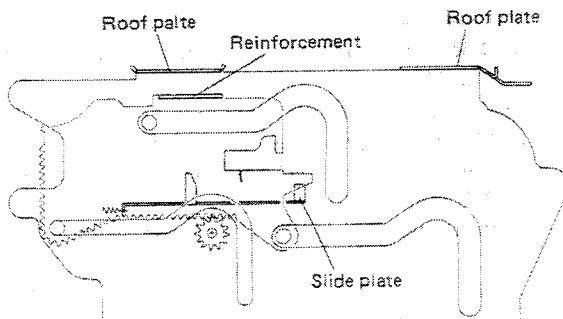


Fig. 2-4 Cassette housing

[A] Cassette housing removal

1. Disengage the connector from the cassette housing board.
2. Take out the four screws ① and remove the cassette housing in the upward direction.
3. Take out the screws and slide the front panel toward you. This permits easy removal of the cassette housing.

Note: To operate mechanism after removal of the cassette housing, observe the following steps.

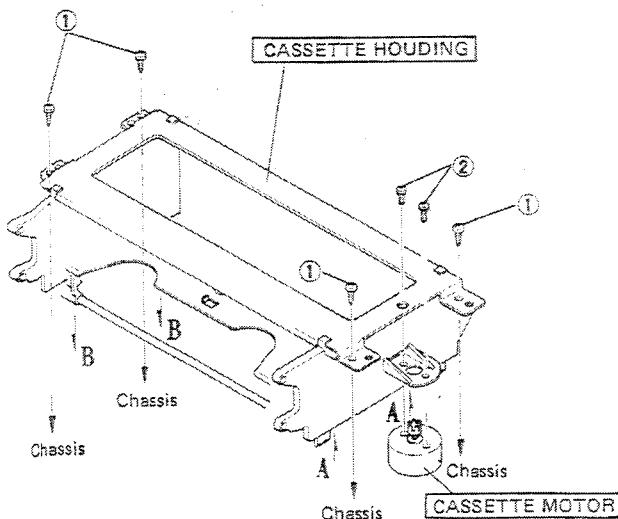


Fig. 2-5 Cassette housing removal

• Mechanism functions

- 1) Put the cassette housing on the hinter bracket with the surface downward as shown in Fig. 2-6. At this time, do not disengage the connector from the cassette housing board.
- 2) Insert a cassette into the housing. The housing mechanism functions to retract the cassette.
- 3) Since the required sensors are contained within the housing, after the cassette has been retracted, the desired modes can then be set by using the operation switches.

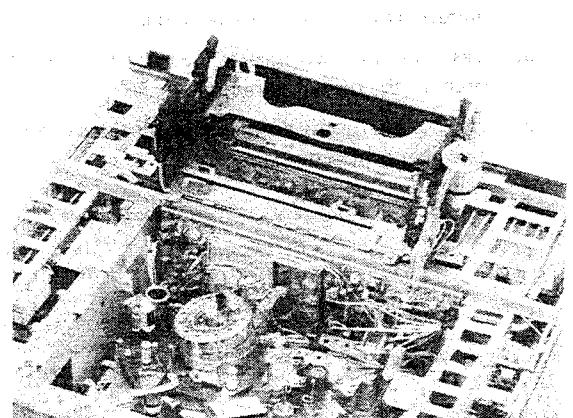


Fig. 2-6 Mechanism functions

[B] Cassette motor

1. Remove the cassette housing. Unsolder the two wires from the cassette motor.
2. Take out two screws ② and remove the cassette motor.
3. Replace the cassette motor and reassemble by reversing the above steps. Use care regarding the motor wires polarity.

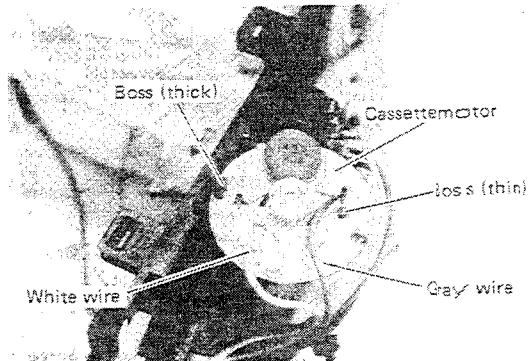


Fig. 2-7 Cassette motor wiring

2.5.2 Upper drum and brush sub assembly/slip ring assembly

1. Take out the screw (A) and remove the brush assembly.
 2. Loosen the setscrew of the slip ring assembly, then unsolder the three slip ring wires and remove the slip ring assembly in the upward direction.
 3. Unsolder four video head wires.
 4. Take out the two screws (E). After removal of the drum circuit board, unsolder the eight rotary transformer wires.
- Note:** Perform quickly to avoid damaging the wires.
5. Take out the two screws (B) and remove the upper drum in the upward direction.
 6. Replace the upper drum and brush subassembly/slip ring assembly at the same time.

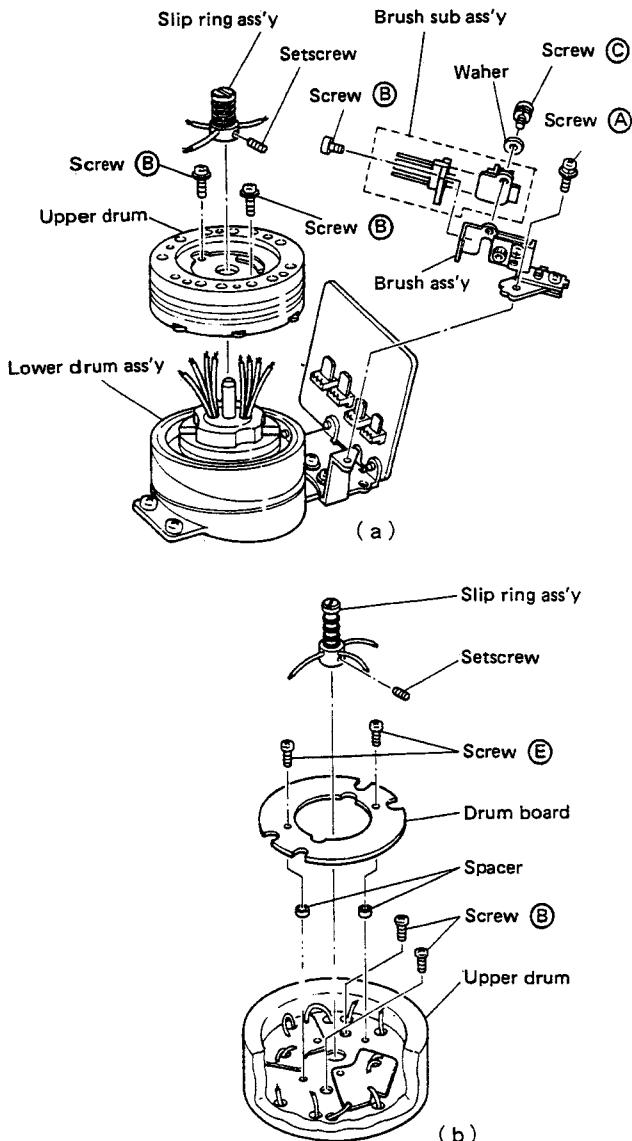


Fig. 2-8

7. Take out the screws (C) and (D) and replace the brush subassembly.
8. Use alcohol to clean the lower face of new upper drum and the upper face of lower drum.
9. Reassemble the upper drum by reversing the above steps.
10. After completion of replacement, perform the following check and adjustments.
 - 1) Upper drum eccentricity adjustment (see section 2.6.16).
 - 2) Tape transport system (see section 2.7).
 - 3) Switching point (see section 3.6.6 to 9).
 - 4) Sub-tracking (see section 3.7.7).
 - 5) Video head resonance and Q (see section 3.9.10).
 - 6) Color reproduction and channel balance (see section 3.9.11).
 - 7) FM equalizer (see section 3.9.12).
 - 8) FM recording level (see section 3.9.9).
 - 9) Color recording level and channel balance (see section 3.9.24).
 - 10) Brush assembly height and contact pressure (see section 2.6.15).

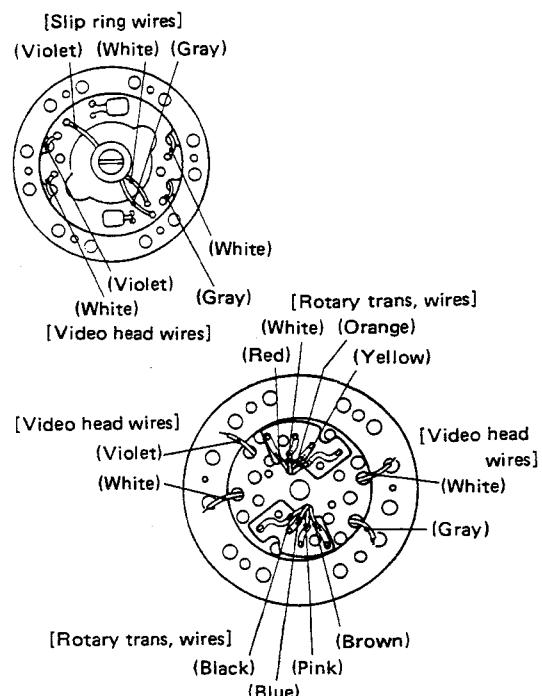


Fig. 2-9 Upper drum top view

2.5.3 Lower drum assembly

The drum motor, cannot be replaced as a single motor component.

1. Disengage the connector from the lower drum assembly (from the bottom side).
2. Remove the brush assembly and the upper drum assembly.

3. Take out the two screws **(A)**, one screw **(B)** and one screw **(C)**, then remove the R.T. select board with the board bracket.
4. Unsolder the eight wires from the R.T. select board.
5. Take out the two screws **(D)** and remove the lower drum ass'y, in the upward direction.
6. Take out the two screws **(E)** and remove the heater from the lower drum ass'y.
7. Place a new lower drum ass'y reassemble by reversing the above steps. Use care not to damage the assembly.

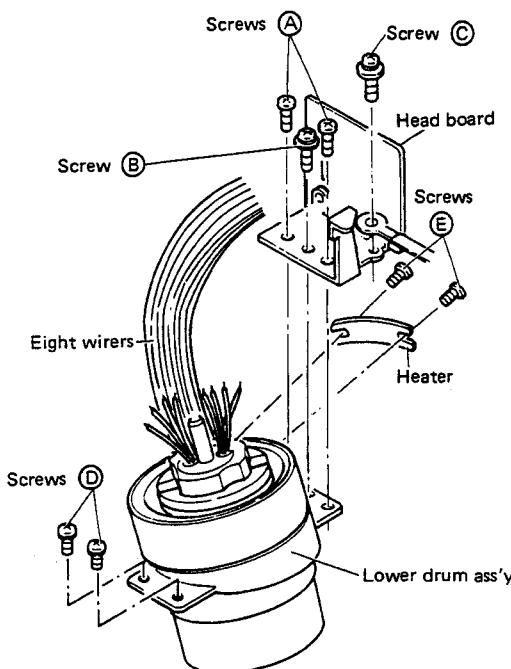


Fig. 2-10 Lower drum replacement

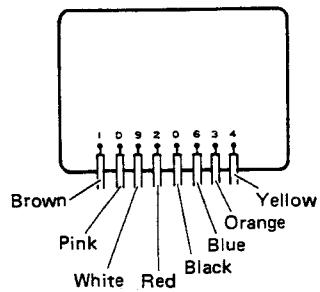


Fig. 2-11

8. Perform the following checks and adjustments.

 - 1) Drum pulse pickup head positiong (section 2.6.13).
 - 2) Upper drum eccentricity adjustment (section 2.6.16).
 - 3) Tape transport system (section 2.7).
 - 4) Switching point (section 3.6.6 to 9).
 - 5) Sub-tracking (section 3.7.7).
 - 6) Video head resonance and Q (section 3.9.10).

- 7) Color reproducing level and channel balance (section 3.9.11).
- 8) FM equalizer (section 3.9.12).
- 9) FM recording level (section 3.9.9).
- 10) Color recording level and channel balance (section 3.9.24).

2.5.4 Capstan motor assembly

The capstan motor cannot be replaced as a single motor component. Replace the capstan motor ass'y which includes the capstan, capstan FG and flywheel when the capstan motor requires replacement. Do not take out the two screws on the bottom side.

1. Disengage the two connectors from the capstan motor assembly (from the bottom side).
2. Take out the three screws and remove the capstan motor ass'y.
3. Install a new capstan motor ass'y by reversing the above steps.

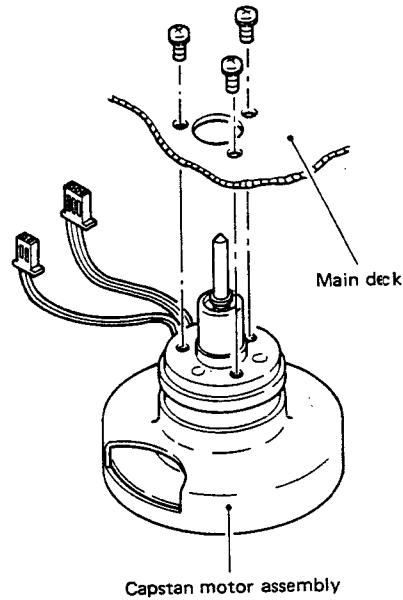


Fig. 2-12

2.5.5 Supply reel motor

1. Remove the cassette housing ass'y (section 2.5.1).
2. Take out the screw and E-ring then remove the supply reel FG board and supply brake temporarily.
3. Loosen the setscrew and remove the supply reel disk ass'y in the upward direction.
4. Disengage the connector, from the reel motor (from the bottom side).
5. Take out the four motor screws and remove the supply reel motor.
6. Install a new supply reel motor and reassemble by reversing the above steps.
7. Perform the reel disk height adjustment (section 2.6.2).

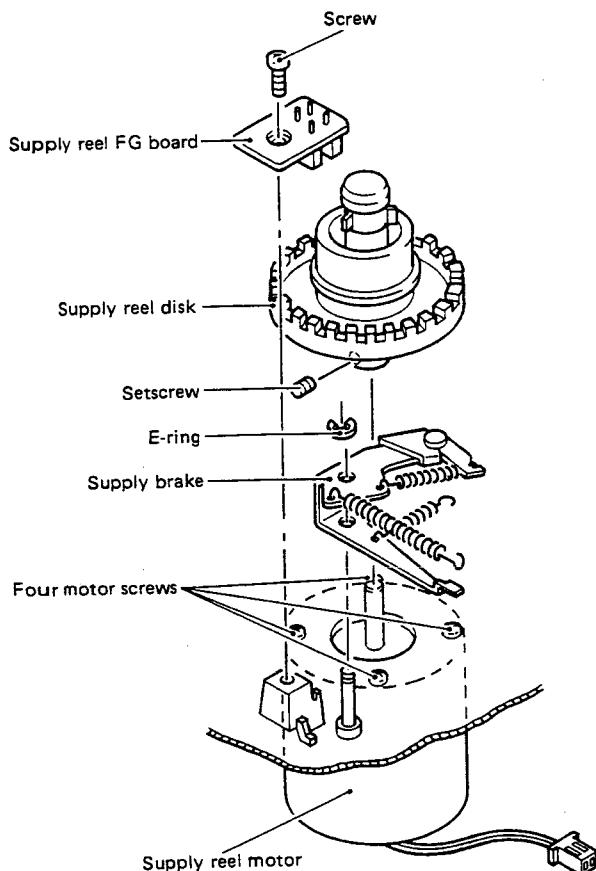


Fig. 2-13

2.5.6 Take-up reel motor

1. Remove the cassette housing ass'y (section 2.5.1).
2. Take out the screw and two E-ring, then remove the take-up reel FG board, loading tension lever and take-up brake temporarily.
3. Loosen the setscrew and remove the take-up reel disk ass'y in the upward direction.
4. Loosen the two screws and temporarily remove the brake solenoid.
5. Disengage the connector from the take-up reel motor.
6. Take out the four screws and remove the take-up reel motor.
7. Install a new take-up reel motor and reassemble by reversing the above steps.
8. Perform the reel disk height adjustment (section 2.6.2).

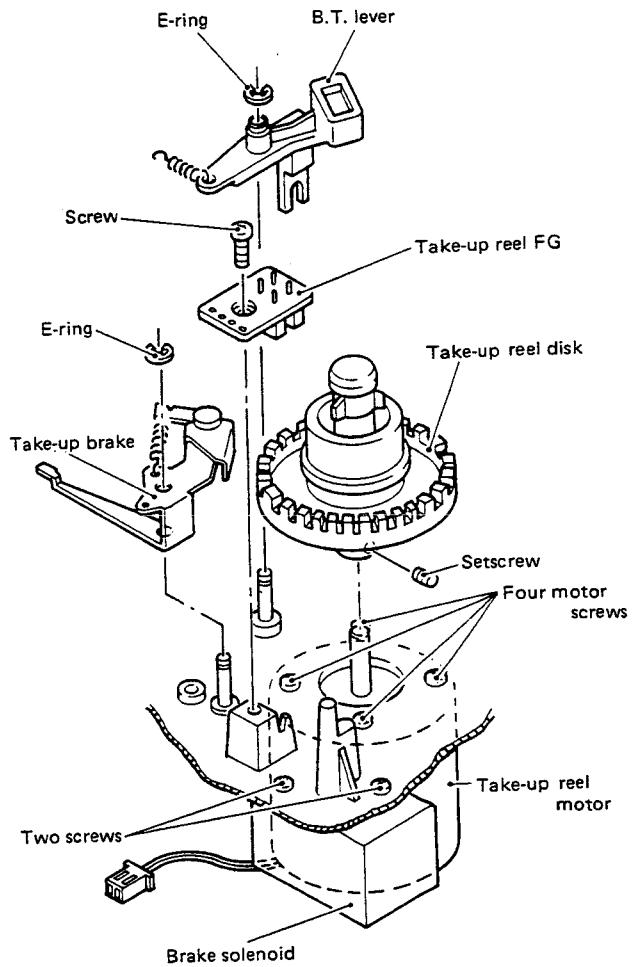


Fig. 2-14

2.5.7 Loading drive gear assembly/loading motor

Note: Before replacing the loading motor, carefully observe its mounting condition (particularly wire polarities, positioning and clamping).

1. Take out the two screws **(A)** and remove the loading drive gear assembly.
2. Unsolder the wires from the motor terminals.
3. To replace loading drive gear assemblies, place a new assembly by reversing the above steps and proceed to 7 below and after. In case of motor replacement, proceed to 4 below.
4. Disengage the belt from the pulley, take out the two screws **(B)** and remove the motor from the loading gear assembly.
5. Loosen the setscrew and remove the motor pulley.
6. Place a new loading motor and reassemble by reversing the above steps. At the time, use care as to wire polarities. Use a 0.5 mm thickness gauge to mount the motor pulley.
7. Move the pole base on the subdeck by hand to the loading end position and install the loading gear assembly.
8. Turn the loading motor pulley by hand to move the loading ring slightly in the unloading direction. Check for equal spacing between the supply pole guide and supply pole base, and between the take-up pole guide and take-up pole base. See Fig. 2-16. If not equal, the loading gear ass'y mounting position is incorrect. Repeat the above step 7.

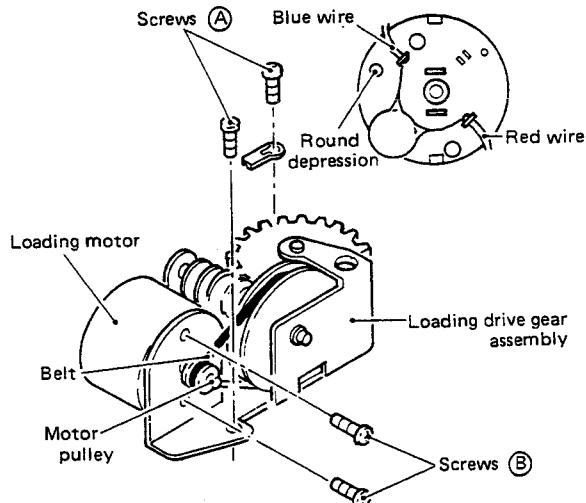


Fig. 2-15 Loading motor replacement

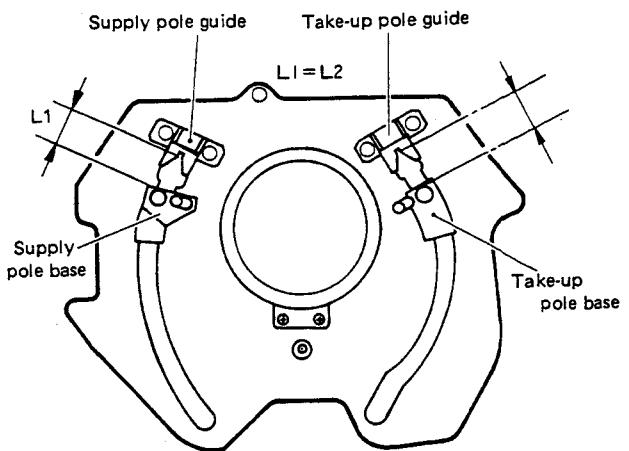


Fig. 2-16 Loading ring check

2.5.8 Audio/control (A/C) head assembly

1. Take out screws **(A)**, **(B)** and **(C)** to remove the A/C head assembly.
- Note:** Use care so that the coil springs do not come off from the bottom side of the A/C head assembly.
2. Remove the A/C head circuit board. Use care not to damage the wires.
3. Replace the A/C head subassembly and reassemble by reversing the above steps.
4. Perform the following checks and adjustments.
 - 1) Tape transport (section 2.7)
 - 2) Audio/control head height (section 2.8.4)
 - 3) Audio/control head azimuth (section 2.8.5)
 - 4) Audio/control head position (section 2.8.6)
 - 5) Interchangeability adjustment (section 2.8)
 - 6) Audio adjustment (section 3.8).

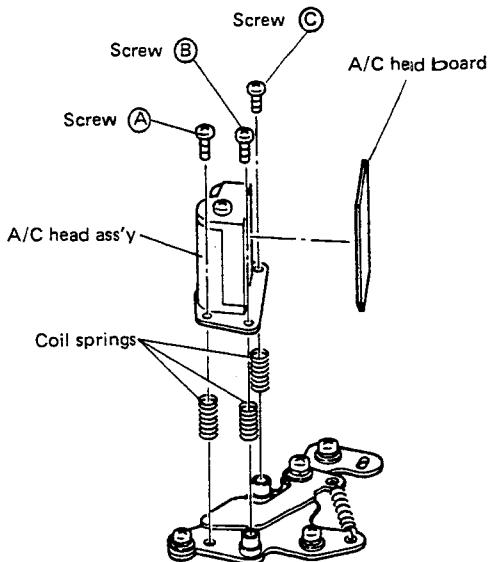


Fig. 2-17 A/C head replacement

2.6 CHECKS AND ADJUSTMENT

2.6.1 Master plane jig setting

1. Remove the cassette housing assembly.
2. As shown in Fig. 2-18, position the master plane jig with respect to the reference shaft, pinch roller shaft and the stud.

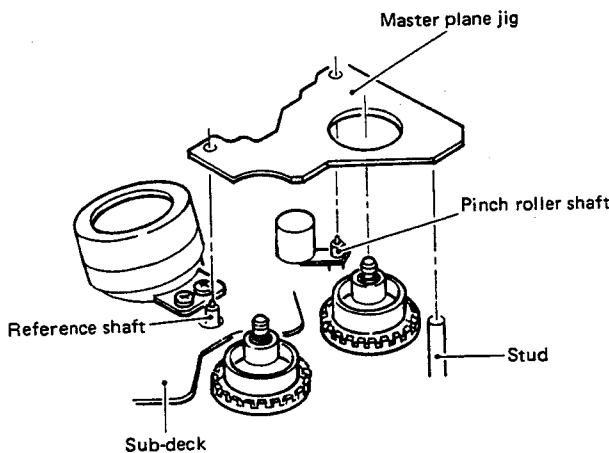


Fig. 2-18 Master plane jig setting

2.6.2 Reel disk height

1. Set the master plane jig.
2. Use the height gauge (PUJ42147-2) to confirm that the reel disk height. Measure at 2 places 90° apart. When measuring, press the reel disk downward to compensate for mechanical play.
3. The correct height is between planes A and B, as shown in Fig. 2-19. If necessary, loosen the setscrew and adjust to the correct height.

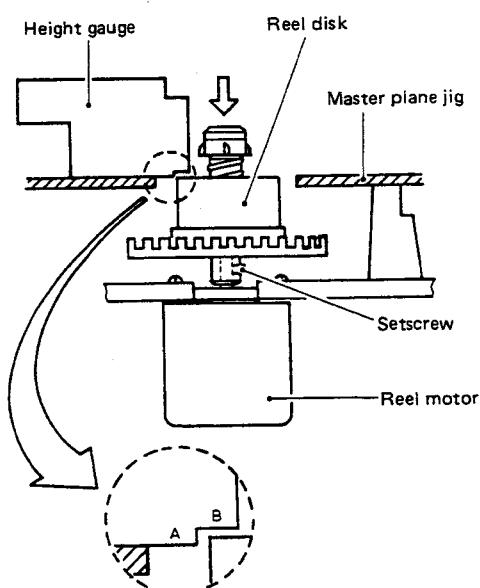


Fig. 2-19 Reel disk height adjustment

2.6.3 Supply guide pole height

1. Set the height gauge (PUJ42147-2) on the subdeck and check the perpendicularity.
2. Confirm that the height of the lower face of the upper flange. If necessary, carefully adjust by turning the nut.
3. If guide pole height has been adjusted, tape transport adjustments are required (see section 2.7).

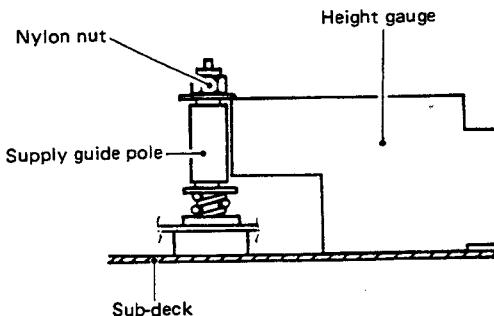


Fig. 2-20 Supply guide pole height adjustment

2.6.4 Take-up tape guide roller height

1. Set the master plane jig. Use the height gauge (PUJ44650) to confirm that the height of the lower face of the upper flange.
2. If necessary, loosen the setscrew on the lower part, then adjust the height by turning the screw on the top.
3. If the height has been adjusted, tape transport adjustments are required (see section 2.7).

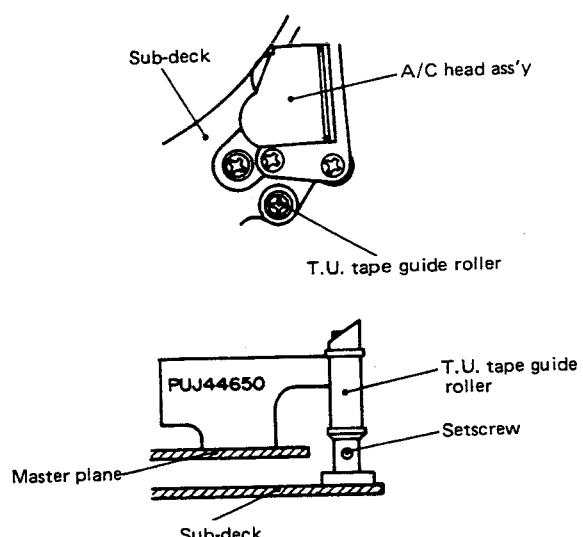


Fig. 2-21 Take-up tape guide roller height adjustment

2.6.5 Take-up tape guide roller parallel

1. Put the place surface of A/C head parallel check plate against the capstan shaft and take-up guide roller.
2. Check that the parallel degree between the capstan shaft and take-up tape guide roller is less than 0.05 mm.

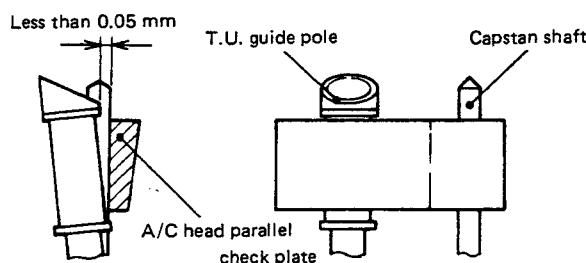


Fig. 2-22 Take-up tape guide roller parallel

2.6.6 Pinch roller

1. By hand, press the pinch roller toward the arrow A to the point where it contacts the capstan.
2. Check that the parallel degree between the pinch roller and capstan is less than 0.05 mm.

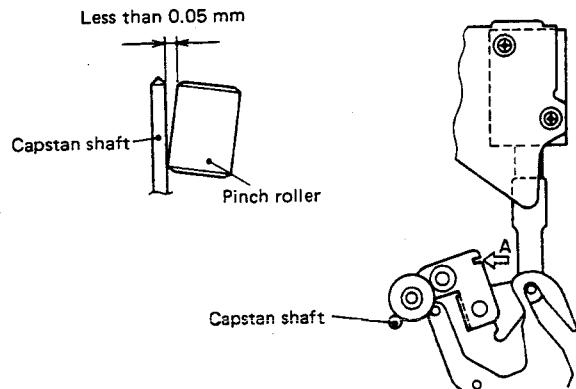


Fig. 2-23 Pinch roller

2.6.7 Differential transformer positioning

1. Referring to section 2.5.1, use a cassette tape, supply power and set for the Play mode.
2. Turn off the power after completion of loading.
3. Confirm that the clearance between the E-ring and differential transformer is 0–0.1 mm when the tension arm is in contact with the base of supply guide pin.
4. If not, adjust by turning the socket bolt with a 2.4 hex key.

Note: The clearance is more easily checked from the rear side.

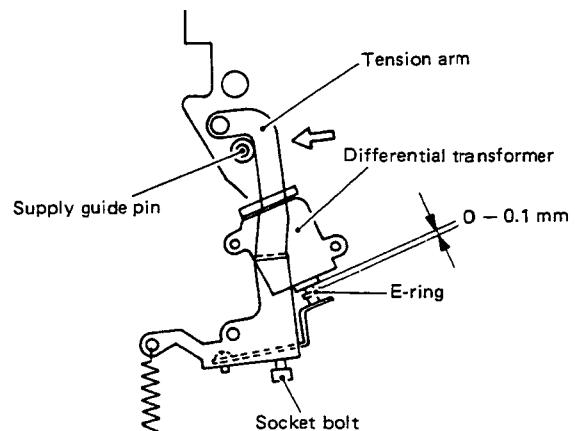


Fig. 2-24 Differential trans.

2.6.8 Pinch roller solenoid

1. Referring to section 2.5.1, insert a cassette tape, supply power and set for the Play mode.
2. Confirm that the space between the solenoid lever and spring is 0.5–1 mm.
3. If necessary, adjust solenoid position by loosening the two screws, then tighten the two screws again.

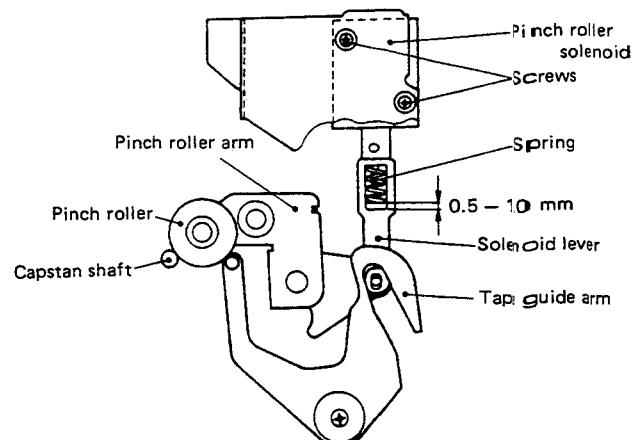


Fig. 2-25 Pinch roller solenoid

2.6.9 Photo interrupter

1. Insert a cassette tape, supply power and set for the Stop mode. Turn off the power in the state of half loading.
2. Confirm that the space between the drum and tape is 0.5–1.5 mm.
3. If necessary, adjust the photo interrupter (pickout det.) position by loosening the screw.

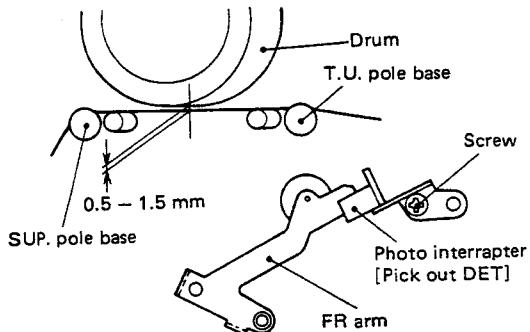


Fig. 2-26

2.6.10 Tension pole perpendicularity

1. Referring to section 2.5.1, insert a cassette tape, supply power and set for the Play mode. Turn off the power in this state.
2. Set the height gauge on the subdeck and press the tension arm toward the arrow B to the point where the tension arm contact the height gauge lightly.
3. Check that the perpendicularity degree between the tension pole and height gauge is less than 0.05 mm.

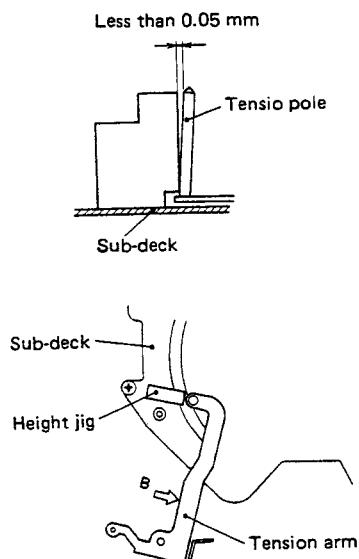


Fig. 2-27 Tension pole perpendicularity

2.6.11 Take-up guide pole height

1. Set the master plane jig. Use the height gauge (PUJ-44650) to confirm that the height of the lower face of the upper flange.
2. If necessary, adjust the height by turning the nut as shown in Fig. 2-28.
3. If the height has been adjusted, tape transport adjustments are required (see section 2.7).

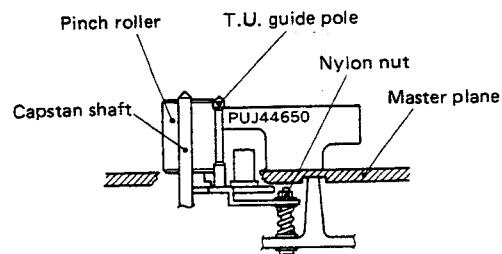


Fig. 2-28 Take-up guide pole height

2.6.12 Take-up guide pole perpendicularity

1. Set the master plane jig. Use the height gauge (PUJ-44650) to measure at the two orthogonal places (X-Y') as shown in Fig. 2-29(c).
2. To measure at the Y' place, check that the perpendicularity degree between the take-up guide pole and height gauge is less than 0.05 mm as shown in Fig. 2-29(a).
3. In the same manner, check at the X place as shown in Fig. 2-29(b).
4. Perform the following check after completing steps 2 and 3. Check that tilt of take-up guide pole is less than 0.05 mm in both X and Y directions (shaded position) as shown in Fig. 2-29(c).

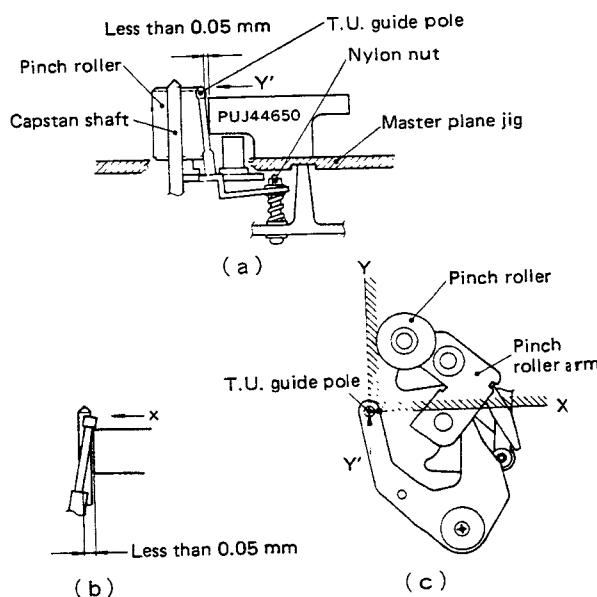


Fig. 2-29 Take-up guide pole perpendicularity

2.6.13 Drum pickup head positioning

1. Check that the space between the drum motor magnet and pickup head is 0.3 mm.
2. If not loosen the screw and adjust the pickup head using 0.3 mm thickness gauge.

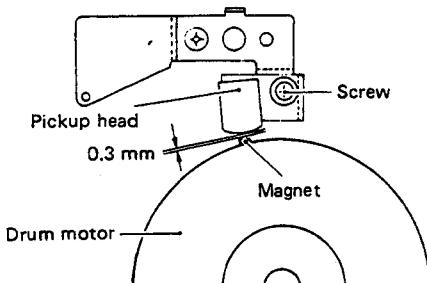


Fig. 2-30 Drum pickup head

2.6.14 Torque adjustment

Perform the following checks and adjustment after completing reel servo adjustment.

[A] Loading supply back tension

1. Use the digital voltmeter and set for the Play mode.
2. During loading, confirm that the level between TP-10 and TP-11 of Reel servo board is 10 ± 2 mV. If not, adjust R29 of reel servo board for 10 mV.
3. If not, adjust R29 of the reel servo board for 15 ± 4 g-cm.

[B] Playback back tension

1. Use the cassette torque meter (PUJ42881) and set for the Play mode.
2. During the Play mode, check that the left side meter indicates 41 ± 2 g-cm and the TP-1 level of reel servo board is $0.31 - 0.36$ Vp-p. If not, perform the following steps.
3. Perform 'Differential transformer positioning' (section 2.6.6) and 'Supply det. level' (section 3.4) adjustments.
4. Using the cassette torque meter, set for the Play mode and adjust R167 of the reel servo board for 41 ± 2 g-cm.
5. When 41 ± 2 g-cm back tension is obtained, confirm that the level at TP-1 of the reel servo board is $0.31 - 0.36$ Vp-p during the Play mode. If not, adjust the adjustment lever position carefully, then repeat steps 4 and 5 until the specified results are obtained.
6. If 41 ± 2 g-cm back tension cannot be obtained by step 4, adjust the adjustment lever position carefully, then repeat steps 4 and 5 until the specified results are obtained.
7. Figure 2-31 shows the state after completing the adjustment.

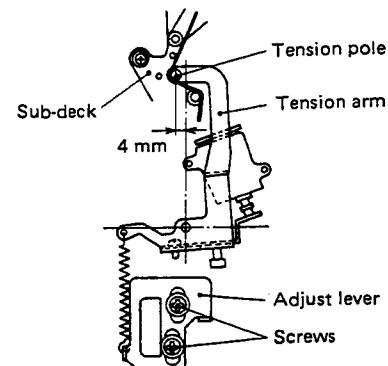


Fig. 2-31

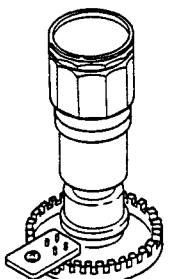
[C] Playback take-up torque

1. Use the cassette torque meter (PUJ42881) and set for the Play mode.
2. During the Play mode, check that the right side meter indicates 100 ± 15 g-cm.
3. If not, adjust R142 of the reel servo board for 100 ± 15 g-cm.

[D] Fast Forward (FF) and Rewind (REW) torque

1. Referring to section 2.5.1, set a cassette tape and supply power.
2. Use the torque gauge (PUJ48075-3) and set it on the take-up reel disk.
3. Hold the torque gauge, then set for the FF mode.
4. Relax the grip on the torque gauge so that the indicator needle and scale rotate at equal speeds, then read the indication. The correct value is 300 g-cm or more.
5. In the same manner, check the rewind mode.
6. If incorrect value, check the reel servo circuit.

- [E] Fast Forward (FF) and Rewind (REW) reel brake torque
1. Referring to section 2.5.1, set a cassette tape and supply power.
 2. Set for the Stop mode, then let the back tension lever, supply main brake and take-up main brake move toward the arrow C.
 3. Set the torque gauge on the take-up reel disk. Relax the grip on the gauge so that the disk turns slowly in the direction of the arrow B. Read the indication at the point where the indicator and scale rotate at equal speed. The correct value is 25 ± 5 g-cm.
 4. In the same manner, check the rewind mode. Set the gauge on the supply reel disk and let the disk turn in the direction of the arrow A. The correct value is 25 ± 5 g-cm.



(a) FF/REW Torque

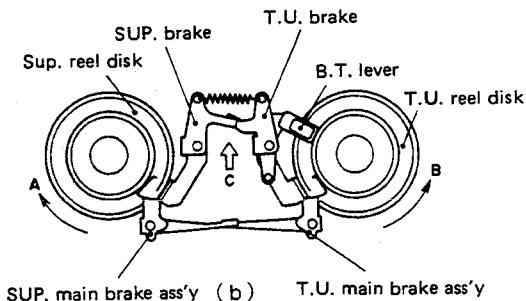


Fig. 2-32

[F] Search reverse tension

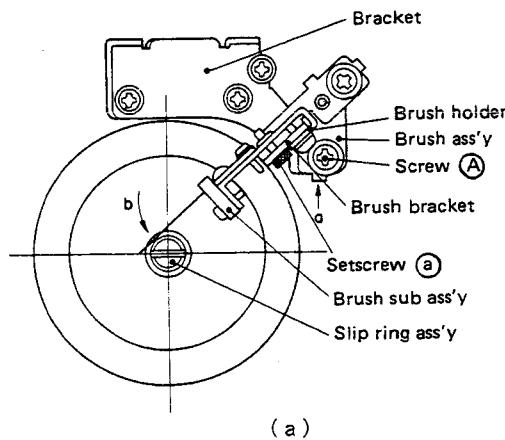
1. Use the cassette torque meter (PUJ42881-B) and set for the Search Reverse Slow mode.
2. During this mode, check that the right side meter indicates 50 ± 2 g-cm and the TP-10 level of reel servo board is 450 ± 100 mV.
3. If not, adjust R183 of the reel servo board for 50 ± 2 g-cm.

[G] Unloading supply tension

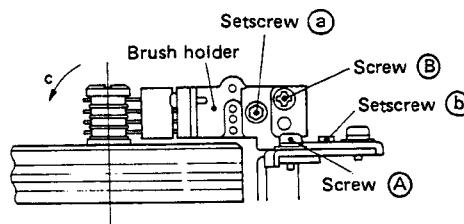
1. Use the cassette torque meter (PUJ42881-B) and change for the Stop from the Play mode.
2. During the unloading mode, check that the left side meter indicates 90 ± 8 g-cm and the TP-10 level of reel servo board is 135 ± 10 mV DC.
3. If not, adjust R32 of the reel servo board for 90 ± 8 g-cm.

2.6.15 Brush assembly height and contact pressure

- If the brush sub assembly has been replaced, height and contact pressure adjustments are required.
1. When installing the brush sub assembly, check that the brush fits the brush board perfectly.
 2. When installing the brush assembly, after loosening the setscrew (a), check that the brush holder is parallel with the brush bracket.
 3. When fixing the brush assembly to the bracket, turn it in the direction of the arrow b by pressing from the direction of the arrow a. Fasten the screw (A) at the point just before the brush contacts slip ring periphery of the slip ring assembly.
 4. At this time, check that the brush comes to the center of the slip ring width as shown in Fig. 2-33b.
 5. If too high, loosen the setscrew (b), then screw (B) and turn the brush holder toward arrow c. Tighten the screw (B) at the point where it is a little lower from the center, then fasten the setscrew (b) so that the brush comes to the center. If too low, tighten the setscrew (B).
 6. Tighten the setscrew (a) to the point just before the brush holder begins to bend. This is "0" turn state of the setscrew.
 7. Tighten the setscrew (a) by "3/4" from the "0" turn state to secure the contact pressure.
 8. After completion of adjustment, lock the screw (A) and setscrew (b).



(a)



(b)

Fig. 2-33

2.6.16 Upper drum eccentricity

- If the upper drum is mounted even slightly out of center with respect to the drum shaft, relative head-to-tape speed becomes inconsistent within the rotation period of the upper drum. This can cause jitter and picture distortion.
- After the upper drum is replaced, perform the following adjustments.

1. Referring to section 2.5.1, insert a cassette tape and set for the Play mode.
2. After completion of loading, switch off the power.
3. Set the micro-checker (PUJ49712-2) on the guide pin as shown in Fig. 2-34. Use the accessory hex wrench (metric) to tighten the fixing screw.

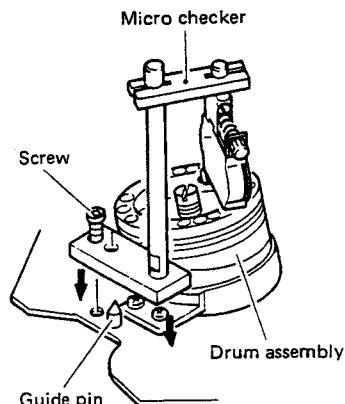


Fig. 2-34

4. Gradually turn the fine adjust knob clockwise so that the dial indicator registers zero on the scale. Adjustment of ± 10 scale divisions is possible on the outer frame, but do not turn more than that.
5. While using care not to apply lateral pressure to the drum, slowly turn the upper drum and read the deviations indicated by the micro checker. Check for needle deflection within 4 microns (± 2 microns).
6. If deviation is greater than 4 microns, turn the fine adjust knob counterclockwise to disengage the test probe from the drum. Loosen the 2 screws of the upper drum, carefully adjust the position, then retighten the 2 screws in a balanced manner. Afterwards, again use the micro-checker to check the eccentricity.
7. After using, turn the fine adjust knob counterclockwise and remove the micro-checker.
8. Supply power and set for the Stop mode. Be sure to remove the cover.
9. Connect oscilloscope to TP-6 of the Pre/Rec board.
10. Gradually turn the TRACKING control and confirm simultaneously maximum CH-1 and CH-2 waveforms.
11. If difference is obvious, remove the upper drum, clean the bottom face of the upper drum and the lower drum flywheel. Reinstall and repeat above steps 1 to 10.

IMPORTANT:

Micro-checker is a test jig for measuring eccentricity of the upper drum.

When using this jig, observe the following precautions.

- As the instrument is extremely precise, use special care not to drop it or subject to strong vibration.
- Do not apply strong force to the test probe.
- The position and direction of the holder have been preset. Do not readjust or disassemble the instrument.
- The outer frame of the scale can be turned about 10 scale divisions in either direction. Do not turn it forcibly (force greater than 300 g-cm).
- Use care that the jig does not contact the video heads.
- Before mounting, turn the fine adjust knob counter clockwise (to where the spring tension is no longer felt).
- When mounting, observe that the test probe movement direction is toward the center portion of the upper drum.
- If an abrasive sound is heard during measurement, check for dust or grit adhering to the test probe or drum face.
- Do NOT apply power while the jig is installed.

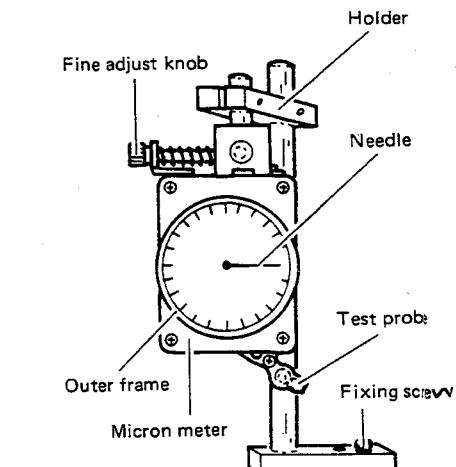


Fig. 2-35 Micro-checker

2.7 TAPE TRANSPORT

The tape transport system has been precisely adjusted at the factory and normally does not require readjustment. The following steps are therefore necessary only in case of severe usage or when replacing parts affecting the tape transport system.

2.7.1 Tape transport check

- Employ a 120 minute tape and check at tape begining and ending portion according to the following steps.
- Operate the machine between Play and Stop modes several times.

During Loading and Unloading, observe the tape at the supply, take-up and take-up tape guide rollers.

Confirm absence of curling, wrinkling, etc.

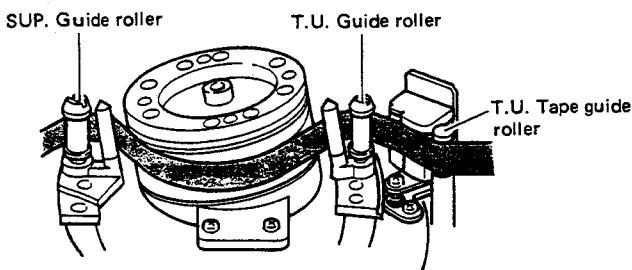


Fig. 2-36 Drum lead check-1

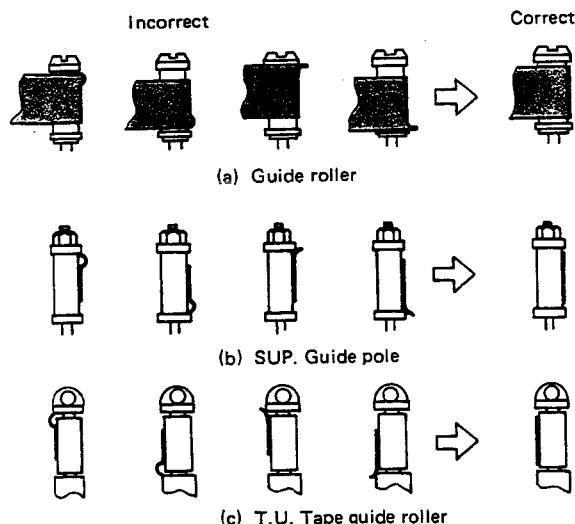


Fig. 2-37 Guide roller and Guide pole

- Observe the tape as it becomes wrapped around drum during loading and as it separates from the drum during unloading.
Confirm absence of damage to the tape and absence of contact noise at the drum lead.
- During the Play mode, observe the tape at the input and output portions of the drum lead.
Confirm that the tape slips neither upward nor downward with respect to the lead.

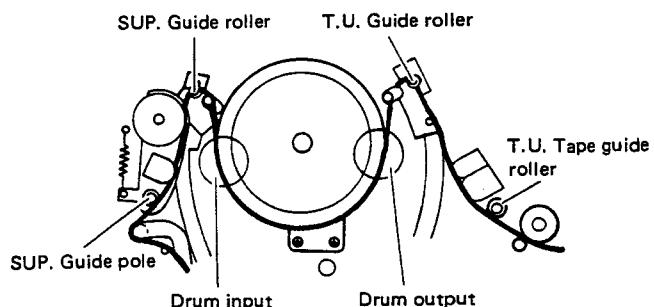


Fig. 2-38 Tape transport check

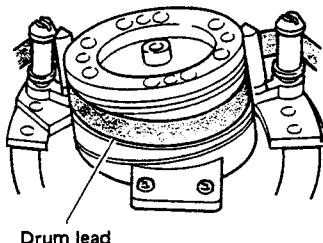


Fig. 2-39 Drum lead check-2

Notes:

- Slips upward : sound becomes produced by contact between tips of rotating heads and edge of tape.
- Slips downward : tape curls or wrinkles from contacting lead face (sound may also be produced).
- During Play and Search FWD modes, observe the tape at the supply guide pole, supply guide roller, take-up guide roller and tape guide.
Confirm absence of curling, wrinkling, etc. as shown in Fig. 2-37.
- During Search REV mode, confirm that the tape guide does not contact the tape and absence of curling, wrinkling, etc. at the supply guide pole, supply guide roller and take-up guide roller.
- At the time of switching between Search FWD and Search REW modes, observe the tape at the supply guide pole, supply and take-up guide rollers. Confirm absence of curling, wrinkling, etc.
- If necessary, perform adjustments according to section 2.7.2.

2.7.2 Tape transport adjustments

Perform only if defects are noted during tape transport check (2.7.1).

[A] Guide roller height

1. The guide roller is fixed with a setscrew. Adjust the supply guide roller with respect to the drum input and the take-up guide roller with respect to the drum output.
2. Loosen the setscrew on the side to be adjusted. Loosen it only enough to allow the guide roller to be turned smoothly with a slotted screwdriver. Use care not to overloosen it.
3. Insert a cassette tape and set for the Play mode.
4. With a slotted screwdriver, turn the supply guide roller and adjust so that the tape travels smoothly in the drum lead.
5. Tighten the setscrew after completion of adjustment.

[B] Supply guide pole

1. Use a cassette tape and set for the Play mode.
2. Use a nut driver to adjust so that curling or wrinkling of the tape does not occur at the supply guide pole.

Note: This adjustment must be within 0.5 mm (one nut turn is 0.5 mm) with respect to the height adjusted in section 2.6.3. If there is a large discrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

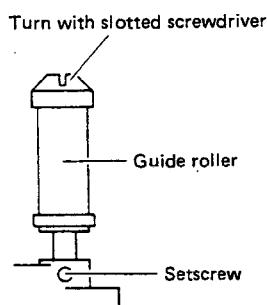


Fig. 2-40 Guide roller

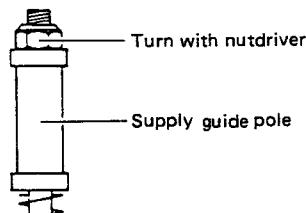


Fig. 2-41 Supply guide pole

[C] Take-up tape guide roller height

1. The take-up tape guide roller is fixed with a setscrew.
2. At the time of adjustment, loosen the setscrew only enough to allow the guide roller to be turned smoothly with a slotted screwdriver. Use care not to overloosen it.
3. Use a cassette tape and set for the Play mode.
4. Adjust by turning the top of the tape guide roller with a slotted screwdriver so that curling or wrinkling of the tape does not occur at the take-up guide roller.
5. Tighten the setscrew after completion of adjustment.

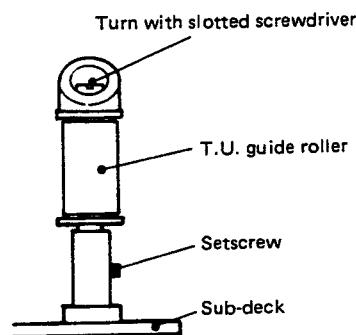


Fig. 2-42 Take-up tape guide roller

[D] Take-up guide pole height

1. Use a cassette tape and set for the Play mode.
2. Use a nut driver to adjust so that curling or wrinkling of the tape does not occur at the take-up guide pole.

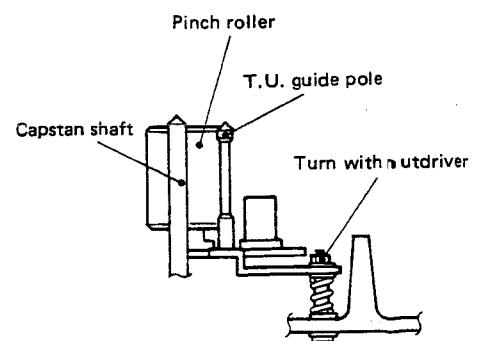


Fig. 2-43 Take-up guide pole

2.8 INTERCHANGEABILITY ADJUSTMENT

Before using the alignment tape, employ a cassette tape and confirm correct tape transport referring to section 2.7.

2.8.1 Preliminary checks

1. Connect oscilloscope to PRE/REC TP-6 (FM OUT). At this time, trigger the oscilloscope externally with the signal from TP-17 of the drum servo board.
2. Play stairstep portion of the JVC alignment tape MH-1.
3. Turn the tracking control and adjust for maximum FM output.
4. As shown in Fig. 2-44, read the maximum FM level (a) and minimum FM level (b), then confirm that:

$$\frac{b}{a} \geq 0.8 (\geq -2 \text{ dB})$$

If the waveform is serrated, read the value at the most uniform serrations.

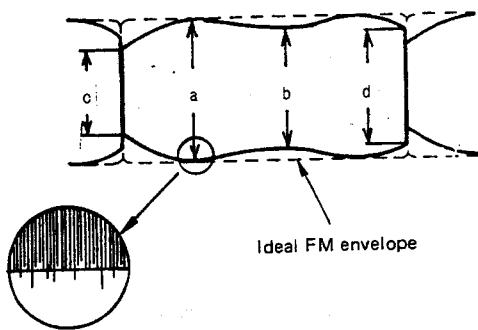


Fig. 2-44 FM waveform (max. output)

5. Read the values at points (c) and (d) [drum input and output] and confirm that:
- $$\frac{c}{a} \geq 0.64 \text{ and } \frac{d}{a} \geq 0.64 (\geq -4 \text{ dB})$$
6. Turn the Tracking control from end to end. The waveform variation should be nearly parallel as shown in Figs. 2-45 and 2-46.
 7. If steps 4 to 6 above are unsatisfied, adjustments are required. Perform adjustments of section 2.8.2 to 2.8.9.

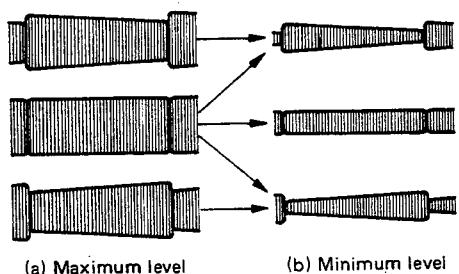


Fig. 2-45 Normal waveform examples

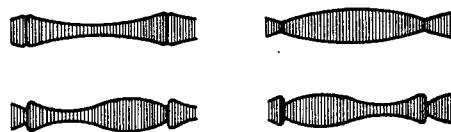


Fig. 2-46 Incorrect waveform examples

2.8.2 Preliminary adjustments

1. Connect oscilloscope to PRE/REC TP-6 (FM OUT). Trigger the oscilloscope externally with the signal from drum servo TP-7.
2. Play starstep segment of the JVC alignment tape MH-1.
3. Turn the Tracking control and adjust for maximum FM output.
4. Loosen the setscrews of the supply guide roller and take-up guide roller to adjust incorrect waveforms each at the drum input and drum output. Loosen them only enough to allow the guide rollers to be turned with a slotted driver.

Drum input

5. Refer to Fig. 2-47. Examples of incorrect waveforms are shown by A and B. Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum input portion) of the waveform becomes flat as shown by C.
6. At this time, confirm absence of tape slippage or wrinkling at the guide pole. If contact noise is heard, reconfirm section 2.6.3 and 2.7.

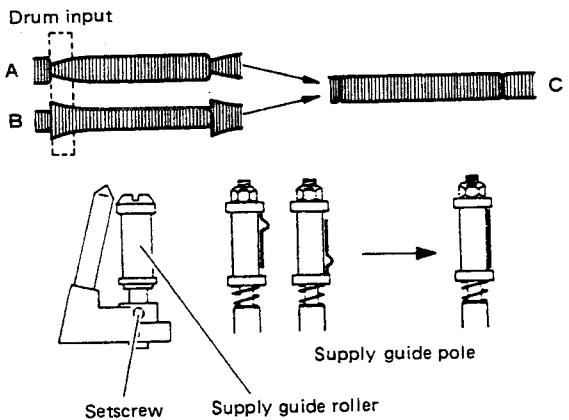


Fig. 2-47 Drum input adjustment

Drum output

7. In the same manner as for the drum input, turn the take-up guide roller to adjust the decay portion (drum output portion) of the FM waveform. Incorrect examples are shown by D and E in Fig. 2-48, while F indicates the correct adjustment.
8. At this time, confirm absence of tape slippage or wrinkling at the take-up tape guide roller. If contact noise is heard, reconfirm section 2.6.4 and 2.7.
9. Carefully and evenly adjust screws **(A)**, **(B)** and **(C)** to align the audio/control head height with the tape as shown in Fig. 2-49.

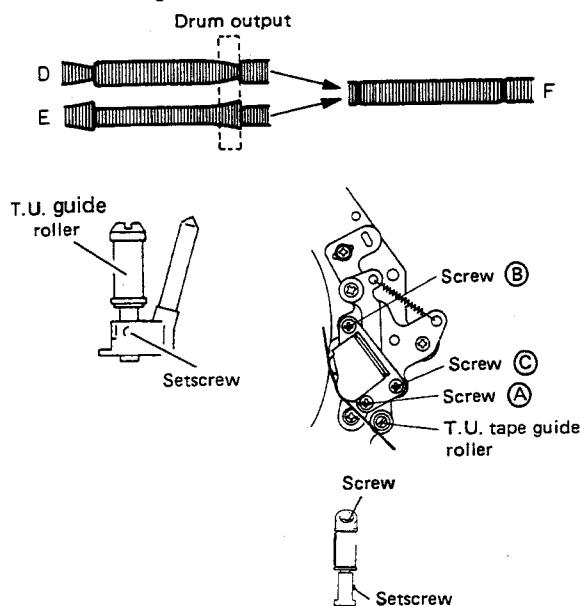


Fig. 2-48 Drum output adjustment

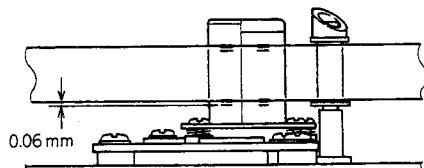


Fig. 2-49 Audio/control head height

2.8.3 Fine adjustment

1. After completion of preliminary checks, connect oscilloscope to PRE/REC TP-6 (FM OUT). Observe FM waveform and adjust the Tracking control for minimum FM output level.
2. If the waveform becomes as shown by A or B of Fig. 2-50, carefully adjust the supply guide roller height so that the waveform becomes as shown by E, F or G of Fig. 2-51.
3. If the FM waveform appears as shown by C or D in Fig. 2-50, carefully adjust the take-up guide roller height to obtain a waveform such as shown by E, F or G of Fig. 2-51.
At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.
4. Vary the Tracking control from maximum to minimum FM output. The waveform variation should be nearly parallel as shown in Fig. 2-52. If not, repeat section 2.8.2 and 2.8.3.
5. Confirm audio/control head height, azimuth and horizontal position. See sections 2.8.4, 2.8.5 and 2.8.6.



Fig. 2-50 Minimum FM output (incorrect examples)

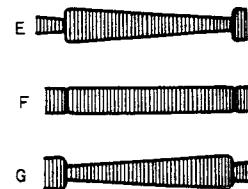


Fig. 2-51 Minimum FM out (correct examples)

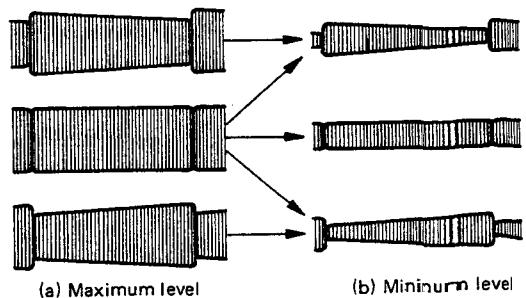


Fig. 2-52 Correct waveform

Note: Setscrew tightening

When tightening the setscrew after completion of adjustment, observe the following.

- 1) Since the guide rollers are easily moved, use care when securing the guide rollers.
- 2) Perform in Stop mode.
- 3) After tightening the setscrews, again perform preliminary checks, section 2.8.2

2.8.4 Audio/control head height

- Incorrect audio/control head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.
- Connect a vacuum tube voltmeter (VTVM) or an oscilloscope to the AUDIO OUT CH-1 connector.
 - Play 1 kHz segment of the alignment tape MH-1.
 - Check that the audio output level increase does not exceed 0.5 dB as the tape is lightly pressed down point (A) as shown in Fig. 2-53.
 - In the same manner, check that the audio CH-2 level increase does not exceed 0.5 dB as the tape is lightly pushed up at point (B).
 - If level increase is more than 0.5 dB in step 3 or 4, perform following adjustment.

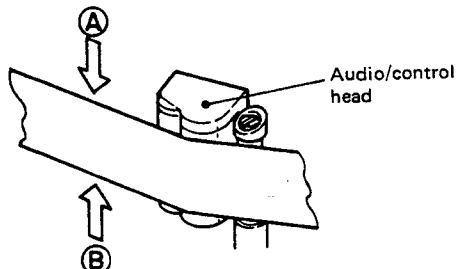


Fig. 2-53 Audio head height check

- Connect CH-1 probe of the oscilloscope to AUDIO OUT CH-1 connector (or TP-12 of Audio board) and CH-2 probe to AUDIO OUT CH-2 connector (or TP-13 of Audio board).
- Adjust the oscilloscope for equal maximum levels for CH-1, when the tape is lightly pressed downward at point (A), and CH-2, when the tape is lightly pressed upward at point (B).
- Turn screws (A), (B) and (C) in succession by small and equal increments at a time and adjust for the same levels between CH-1 and CH-2.
- If tape curling, wrinkling, etc. occurs at the T.U. tape guide roller, reconfirm section 2.6.4 and 2.7.
- Perform azimuth adjustment (section 2.8.5).

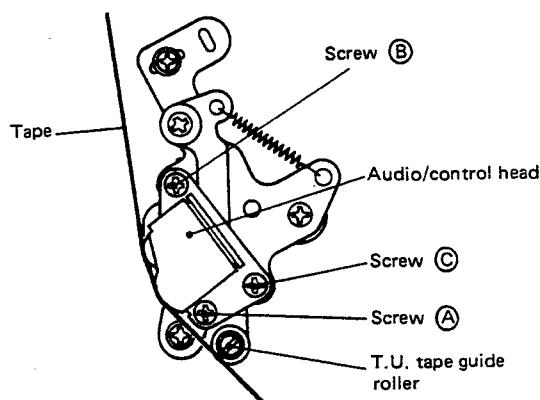


Fig. 2-54 A/C head height adjustment

2.8.5 Audio/control head azimuth

- Perform the following steps only after completing section 2.8.4.
- Connect CH-1 probe of the oscilloscope to AUDIO OUT CH-1 connector (or TP-12 of Audio board) and CH-2 probe to AUDIO OUT CH-2 connector (or TP-13 of Audio board).
 - Play 7 kHz segment of the alignment tape MH-1.
 - Adjust screw (B) (shown in Fig. 2-54 for both maximum output levels and absence of phase difference between CH-1 and CH-2).
 - Confirm the audio/control head height (section 2.8.4).

2.8.6 Audio/control head parallel

- Confirm the audio/control head parallel using the parallel using the A/C head parallel check plate.
- Put the A/C head parallel check plate against the audio/control head as shown in Fig. 2-55 and confirm that the inclination is less than 0.1 mm as shown by A.
- Put the plane surface of the plate against the audio/control head and check that there is no space in the upper portion as shown by B.

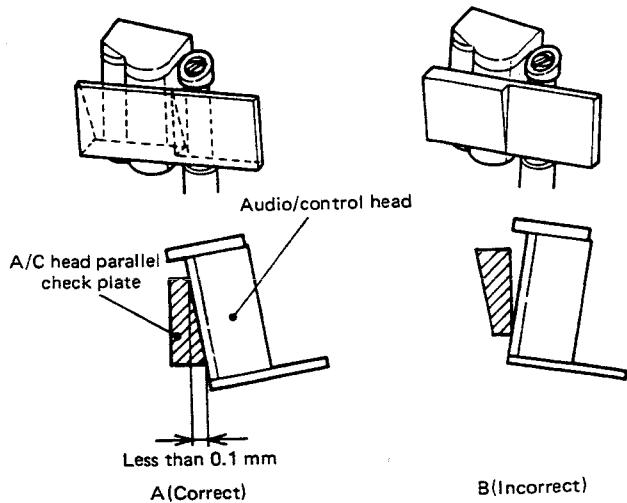


Fig. 2-55

2.8.7 Audio/control head position

The audio/control head must be adjusted to the specified position in order to ensure pre-recorded tape interchangeability.

Perform the following steps only after completing section 2.8.1 through 2.8.5.

1. Connect oscilloscope to TP-6 of PRE/REC board.
2. Play stairstep segment of the adjustment tape MH-1.
3. Turn the Tracking control and confirm that the maximum FM level is obtained at the center click position.
4. If not, set the Tracking control to center click position.
5. Loosen the two screws (D and E) and slide the audio/control head assembly fully in the direction of the drum (indicated by the arrow) as shown in Fig. 2-56.
6. Slightly tighten the two screws (D and E) and play stairstep segment of the alignment tape MH-1.
7. Insert the pins of the audio-control head position tool (PUJ44653) into the hole (H) in the subdeck and (G) in the audio-control head assembly as shown in Fig. 2-57.
8. Slowly turn the tool and set the audio/control head assembly to the position where the second biggest peak FM level is obtained. See Fig. 2-58.
9. While using care not to slide the position of the audio/control head assembly the tow screws (D) and (E).
10. Confirm sections 2.8.1 through 2.8.6.

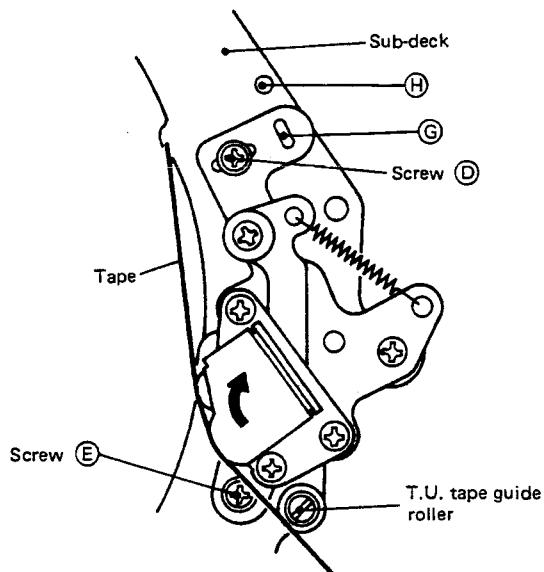


Fig. 2-56

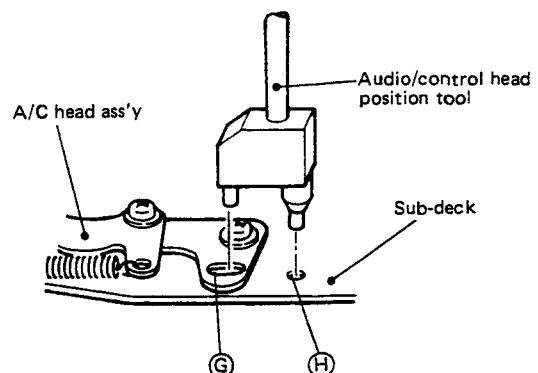


Fig. 2-57

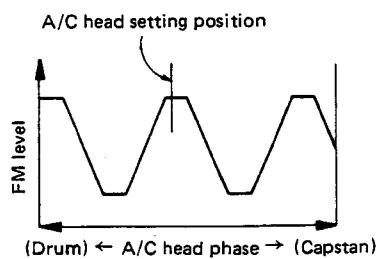


Fig. 2-58

2.8.8 Wow and flutter

1. Play 3 kHz segment of the alignment tape MH-1.
2. Connect the wow-and-flutter meter to the AUDIO OUTPUT.
3. Confirm that the wow and flutter level is less than 0.13% WRMS.

2.8.9 Final checks

1. Confirm preliminary checks (section 2.8.1).
2. Check recording and playback switching point.
3. Check video and audio systems.

SECTION 3

ELECTRICAL ADJUSTMENTS

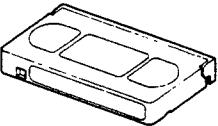
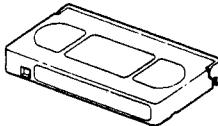
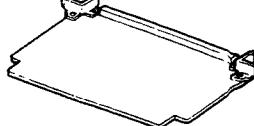
3.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

3.1.1 Required test equipment and jig

1. Digital voltmeter: HEWLETT-PACKARD Model 3476A/B or equivalent
2. Oscilloscope: Wide-band, Dual-trace
3. Signal generator: Color bar, Stairstep
4. Frequency counter: HEWLETT-PACKARD Model 5381A or equivalent
5. Regulated DC power supply
6. Audio generator: Wide-band
7. Alignment tape: JVC MH-1, MH-6
8. Extension board: PUJ25380-2

NOTE: Be sure to first check for smooth and proper tape transport before using the alignment tape.

Alignment tape MH-1	Alignment tape MH-6	Extension board PUJ25380-2
		

Note: Use the Extension board for adjusting the servo board. Note the board orientation must be changed when adjusting the reel servo. See instructions printed on the extension board.

3.1.2 JVC alignment tape contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairstep	7 kHz	<ul style="list-style-type: none"> ● Interchangeability checks and adjustments ● Servo circuit checks and adjustments ● Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	<ul style="list-style-type: none"> ● Tape speed checks ● Wow and flutter checks
3	10 minutes	Color bar	1 kHz (0 dB)	<ul style="list-style-type: none"> ● Video signal playback circuit checks and adjustments ● Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep	(none)	<ul style="list-style-type: none"> ● Video head resonance adjustments, Q adjustments Marker: 2 MHz, 4 MHz, 5 MHz

Table 3-1 MH-1 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	2 minutes	Color sweep	400 Hz (-20 dB)	<ul style="list-style-type: none"> ● Video frequency response playback circuit checks and adjustments ● Audio frequency response playback circuit checks and adjustments
2	2 minutes		100 Hz (-20 dB)	
3	2 minutes		10 kHz (-20 dB)	
4	4 minutes		(none)	

Table 3-2 MH-6 contents

3.1.3 Check and Adjustment steps

The check and adjustment steps are provided in the following in the form of charts. For clarity, the nomenclature used in the charts is outlined below.

Note: Do not use an alignment tape for the mechanism check and tape run check.
When you make the adjustment using the alignment tape, at first, check the tape run function using the recording tape.

No.	Checks and adjustments are numbered in the recommended sequence in which they are to be performed.
Item	Name assigned to the particular check and adjustment step
Check Point	Location to which measuring instrument (oscilloscope unless otherwise noted) is to be connected.
Adjustment Parts	Variable component (resistor, capacitor, etc.) to be adjusted in this step. Dash (-) indicates check only
Signal	Input signal required to perform adjustment. Dash (-) indicates that special signal is not required.
Color bar	Color bar signal as video input
Stairstep	Stairstep signal as video input
1 kHz	Supply a 1 kHz sinewave as audio input signal.
MH-1 Color bar	Play color bar segment of JVC MH-1 alignment tape.
MH-1 Stairstep	Play stairstep segment of JVC MH-1 alignment tape.
MH-1 3 kHz	Play 3 kHz audio signal segment of JVC MH-1 alignment tape.
MH-1 1 kHz	Play 1 kHz audio signal segment of JVC MH-1 alignment tape.
MH-1 RF Sweep	Play RF sweep segment of JVC MH-1 alignment tape.

MH-6 Color sweep	Play color sweep segment of JVC MH-6 alignment tape.
MH-6 400 Hz	Play 400 Hz audio signal segment of JVC MH-6 alignment tape.
MH-6 100 Hz	Play 100 Hz audio signal segment of JVC MH-6 alignment tape.
MH-6 10 kHz	Play 10 kHz audio signal segment of JVC MH-6 alignment tape.
Mode	Equipment operating mode at time of check or adjustment
AUTO	Video mode switch at B/W position
STOP	Power on and machine in Stop mode
REC	Recording mode
P.B.	Play mode
REC → (an- other mode)	Use blank tape, record, then play back in the mode specified.
SLOW	Slow motion playback
SEARCH	Shuttle Search (S-FWD and S-REV) playback mode
AUDIO DUB	Audio dubbing mode
E-E	Input signal to output
FF	Fast Forward mode
REW	Rewind mode
PAUSE	Pause mode
STILL	Still mode playback
Loading	Stop mode to playback mode
Unloading	Playback mode to Stop mode
SEARCH REV	Search reverse mode at 1/15 speed playback
Description and Waveform	This column provides an explanation of the step, notes, adjustment values and waveform diagrams.

3.2 POWER SUPPLY CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	5 V DC output voltage	TP-1 Power	R8 (5 V Regulator)	—	P.B.	1. Connect the digital voltmeter to TP-1 of the power supply board. 2. Adjust R8 (12 V REG) for 5.0 V DC.
2	16.5 V DC output voltage	TP-2 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-2 of the power supply board. 2. Confirm that the DC voltage becomes 16.5 ± 1.0 V.
3	18 V DC output voltage	TP-3 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-3 of the power supply board. 2. Confirm that the DC voltage becomes $18.5 \pm 1.5/-1.0$ V.
4	15 V DC output voltage	TP-4 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-4 of the power supply board. 2. Check for DC voltage of 15 ± 0.7 V.
5	15 V DC output voltage	TP-5 Power	—	—	REC	1. Connect the digital voltmeter to TP-5 of the power supply board. 2. Check for DC voltage of 15.0 ± 0.7 V.
6	12 V DC output voltage	TP-6 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-6 of the power supply board. 2. Confirm that the DC voltage becomes 12.0 ± 0.2 V. Also confirm that the ripple voltage is less than 5 mVp-p.
7	9 V DC output voltage	TP-7 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-7 of the power supply board. 2. Confirm that the DC voltage of 9.0 ± 0.5 V.
8	10 V DC output voltage	TP-8 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-8 of the power supply board. 2. Check for DC voltage of 10 ± 0.5 V.
9	-14 V DC output voltage	TP-9 Power	—	—	P.B.	1. Connect the digital voltmeter to TP-9 of the power supply board. 2. Check for DC voltage of -14 ± 1.0 V.

3.3 SYSTEM CONTROL (SYSCON) CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	IC8 clock frequency	Pin 2 of IC8 Syscon	—	—	STOP	1. Connect frequency counter to pin 2 of IC8 and confirm that the frequency becomes $3,580 \pm 10$ kHz (over 2.5 Vp-p).
2	IC31 clock frequency	Pin 6 of IC31 Syscon	—	—	STOP	1. Connect frequency counter to pin 6 of IC31 and confirm that the frequency becomes 800 ± 2 kHz (over 2.5 Vp-p).
3	IC26 clock frequency	Pin 5 of IC26 Syscon	—	—	STOP	1. Connect frequency counter to pin 5 of IC26 and confirm that the frequency becomes 600–900 kHz (over 2.5 Vp-p).
4	Minimum voltage	TP-4 Syscon	R77 (MIN. VOLT) Syscon	—	STOP	1. Connect digital voltmeter or oscilloscope to TP-4 of the Syscon board. 2. Connect the $10\text{ k}\Omega$ VR to pins 1, 2 and 3 of CN-28 of the Syscon board and turn this VR to obtain minimum DC voltage. 3. Adjust R77 of the Syscon board to obtain DC voltage of 2.7 V.
5	Still width	TP-1, 2, 4 Syscon	R74 (STILL WIDTH),	—	STOP	<p>● Perform the following steps only after completing item 4, Minimum voltage setting.</p> <p>VR1 Clockwise Counter-clockwise FWD REV SEARCH DIAL</p> <p>TP-4 2.9 ± 0.05 V 2.7 ± 0.05 V High</p> <p>TP-1 (REV CMD) LOW High TP-2 (FWD CMD) High LOW</p> <p>Variable by R74</p>

3.4 SEARCH CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Search VR setting	R1 center search	R2 (SEARCH VR) SEARCH	—	SEARCH	1. Set R1 of the search board to the center click position. 2. Connect digital voltmeter to the center of R1. 3. Adjust R2 of the search board to obtain 6 V DC.

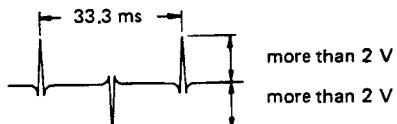
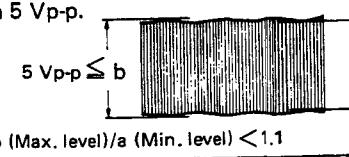
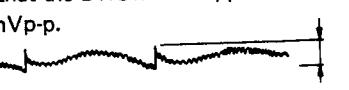
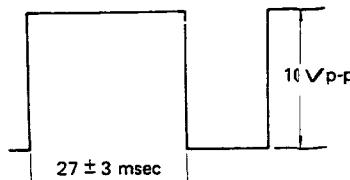
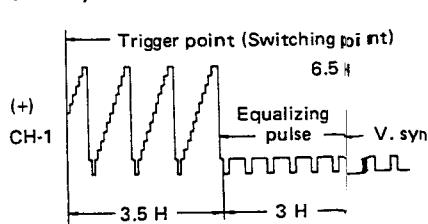
3.5 REEL SERVO CIRCUIT

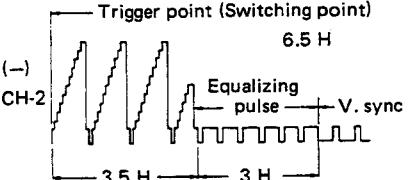
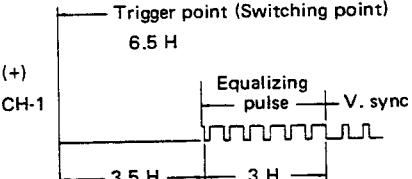
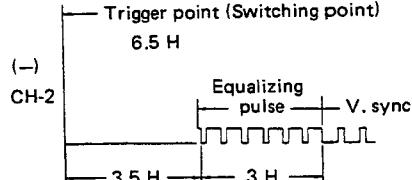
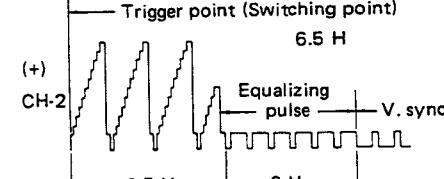
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	OSC Level	TP-3 Reel	R45 Reel (OSC Level)	—	STOP	1. Connect oscilloscope to TP-3 of the Reel servo board. 2. Check for waveform frequency of 3 to 3.8 kHz. 3. Adjust R45 (OSC Level) of the Reel servo board to obtain a waveform level of 3.0 Vp-p.
2	SUP. DC Set	TP-5 TP-12 (GND) Reel	R72 Reel (SUP. DC SET-2)	—	STOP	1. Connect digital voltmeter to TP-5 of the Reel servo board. 2. Adjust R72 of the Reel servo board to obtain 6.0 V DC.
3	TU. DC Set	TP-7 Reel	R109 Reel (TU. DC SET)	—	STOP	1. Connect digital voltmeter to TP-7 of the Reel servo board. 2. Adjust R109 (TU. DC SET) of the Reel servo board to obtain 6.0 V DC.
4	SUP. DC Set-3	TP-10 Reel	R170 Reel (SUP. DC SET-3)	—	P.B. ↓ STILL	1. Connect digital voltmeter to TP-10 of the Reel servo board. 2. Play with a blank tape. 3. Set for Still mode. 4. Move the tension pole to the right end, then adjust R170 of the Reel servo board to obtain 10 mV DC.
5	SUP. DET. Level	TP-1 Reel	R1 Reel (SUP. DET. Level)	—	STOP P.B.	1. Connect oscilloscope to TP-1 of the Reel servo board and set for the Stop mode. 2. Adjust R1 (SUPPLY DET. LEVEL) of the Reel servo board to obtain DC voltage of 0.7 Vp-p. 3. Insert tape and set for the Play mode. 4. Carefully push the tension pole fully to the left side. At this time, confirm that the input level becomes 0.05–0.1 Vp-p at TP-1 of the Reel servo board.
6	SUP. LOAD Tension		R29 Reel	—	LOAD- ING	See 2.6.14A.
	SUP. UNLOAD Tension		R32 (SUP. UNLOAD Tension)		UN- LOAD- ING	See 2.6.14G.
7	SUP. Back Tension		R167	—	P.B.	See 2.6.14B.
8	T.U. Torque		R142	—	P.B.	See 2.6.14C.
9	T.U. LOAD/ UNLOAD Tension	TP-9 Reel	R139 (T.U. LOAD/UNL. T.) Reel		LOAD- ING UN- LOAD-	1. Connect oscilloscope to TP-9 of the Reel servo board. 2. Set for the beginning portion of 120-minute tape, during the Loading mode, adjust R139 (T.U. LOAD/UNL. TENS.) of the Reel servo board to obtain DC voltage of 40 mV. 3. During the Unloading mode, confirm that the voltage remain unchanged.

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
10	T.U. STILL Tension	TP-9 Reel	R145 (T.U. STILL TENS.) Reel		P.B. ↓ STILL	<p>1. Connect oscilloscope to TP-9 of the Reel servo board.</p> <p>2. Set for the Still mode with beginning portion of 120-minute tape and adjust R145 (STILL TENS.) of the Reel servo board to obtain DC voltage of 75 mV.</p>
11	SEARCH REV. Back Tension		R183 (T.U. SEARCH REV.) Reel	—	SEARCH REV. (Slow)	See 2.6.14F.
12	Speed Adj.	TP-17 Reel	R128 (SPEED ADJ.) Reel	—	F.F.	<p>1. Connect oscilloscope to TP-17 of the Reel servo board and set for the FF mode with beginning portion of 120-minute tape.</p> <p>2. Adjust R128 (FF SPEED) of the Reel servo board to obtain DC voltage of 6.8 V as shown below.</p> <p>3. Confirm that the decayed point of waveform level is 3.0 ± 0.5 V DC.</p>

Note: To get the same earth level, the earth of the oscilloscope to be connected to the heatsink of Q10 transistor of the Reel servo board.

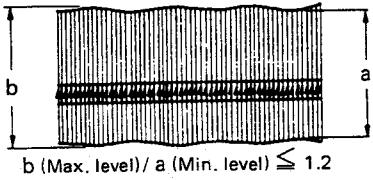
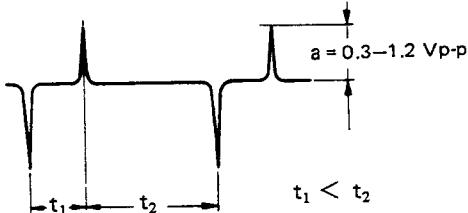
3.6 DRUM SERVO CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Drum Pulse Level	TP-18 Drum Servo	—	Color Bar	REC	<p>1. Connect oscilloscope to TP-18 of the Drum servo board. Confirm that the waveform as shown below.</p> 
2	Drum FG (Frequency Generator) Level	TP-26 Drum Servo	—	Color Bar	REC	<p>1. Connect oscilloscope to TP-26 of the Drum servo board. Confirm the waveform as shown below. Earth line to be connected to TP-27.</p> <p>2. Confirm that the DRUM FG level becomes more than 5 Vp-p.</p> 
3	Drum AC Ripple	TP-29 Drum Servo	—	Color Bar	REC	<p>1. Connect oscilloscope to TP-29 of the Drum servo board.</p> <p>2. Confirm that the DRUM AC ripple level is less than 30 mVp-p.</p> 
4	Drum Discriminator	TP-23 Drum Servo	R97 Drum Servo (DISCRI.)	Color Bar	REC	<p>1. Connect a digital voltmeter to TP23 of the Drum servo board.</p> <p>2. Adjust R97 to obtain a DC voltage of 5.35 V.</p>
5	Rec. CTL Delay (Pulse Width)	TP-20 Drum	—	Color Bar	REC	<p>1. Connect oscilloscope to TP-20 of the Drum servo board.</p> <p>2. Confirm that the REC CTL level becomes 10 Vp-p and 27 ± 3 msec as shown below.</p> 
6	P.B. Switching Point (Normal Mode)	Video OUT	R87 (NOR) Drum Servo P.B. SW-2	MH-1 Stairstep	P.B.	<p>1. Connect oscilloscope to VIDEO OUT -</p> <p>2. Trigger the oscilloscope externally (+ slope) with the signal from TP-17 of the Drum servo board.</p> <p>3. Adjust R87 to position the trigger point 6.5 H from V sync.</p> 

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
6			R85 P.B. SW-1 (NOR.) Drum Servo	MH-1 Stairstep	P.B.	<p>1. Trigger the oscilloscope externally (— slope). 2. Adjust R85 to position the trigger point 6.5 H from V sync.</p> 
7	DC Set 1	TP-21 Drum Servo	R102 (DC SET 1) Drum Servo	—	STOP	<p>1. Connect a digital voltmeter to TP-21 of the Drum servo board. 2. Adjust R102 to obtain a DC voltage of 9.6 V.</p>
8	P.B. Switching Point (Still Mode)	VIDEO OUT	R108 Drum Servo (STILL) P.B. SW-2	MH-1 Stairstep	STILL	<p>1. Connect oscilloscope to VIDEO OUT. 2. Trigger the oscilloscope externally (+ slope) with the signal from TP-17 of the Drum servo board. 3. Adjust R108 to position the trigger point 6.5 H from V sync.</p> 
			R106 Drum Servo P.B.(STILL)	MH-1 Stairstep	STILL	<p>1. Trigger the oscilloscope externally (— slope). 2. Adjust R106 to position the trigger point 6.5 H from V. sync.</p> 
9	REC Switching Point	VIDEO OUT	R89 (REC SW Phase) Drum Servo	Color Bar	REC	<p>1. Connect the oscilloscope to VIDEO OUT. 2. Trigger the oscilloscope externally (+ slope) with the signal from TP-17 of the Drum servo board. 3. Adjust R89 to position the trigger point 6.5 H from V. sync.</p> 

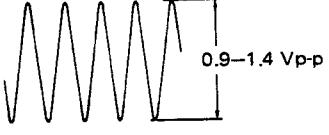
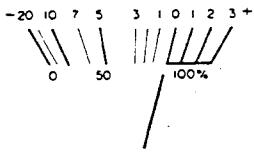
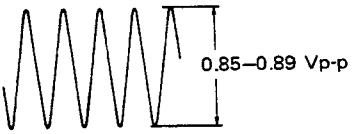
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
10	Dihedral	VIDEO OUT	R87 (DRUM SERVO)	Color Bar	REC	<p>1. Supply a color bar signal to VIDEO IN. 2. Trigger the oscilloscope externally (- slope) with the signal from TP-17 of the Drum servo board. 3. Connect the oscilloscope to VIDEO OUT. 4. Carefully adjust R87 so that T width is within $6.5 \text{ H} \pm 3 \mu\text{sec}$ from V. sync as shown below.</p>
11	Frame Pulse	TP-14, TP-15 Drum Servo	R57 (FRAME ADJ.)	Color Bar	REC	<p>1. Supply a color bar signal to VIDEO IN (Input 1 Vp-p). 2. Trigger the oscilloscope externally (-slope) with the signal from TP-17 of the Drum servo board and set FRAME SERVO switch to OFF. 3. If the waveform appears as Figure (A), operate the INPUT SELECT switch to LINE, TV and LINE to obtain waveform (B). 4. Set the FRAME SERVO switch to ON and check that the waveform shifts from (B) to (A). 5. If this does not occur, adjust R57 of the Drum servo board. 6. Connect a dual trace oscilloscope to TP-14 and TP-15 of the Drum servo board. Trigger the oscilloscope externally (-slope) with the signal from TP-19 of the Drum servo board. 7. Carefully adjust R57 to center the TP-15 pulse with respect to the low level period of the TP-14 waveform. 8. Confirm that the pulse at TP-15 remains to position $10 \pm 1 \text{ H}$ from the front porch of second field.</p>

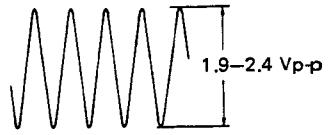
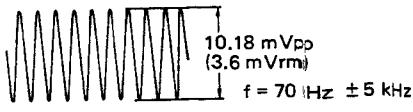
3.7 CAPSTAN SERVO CIRCUIT

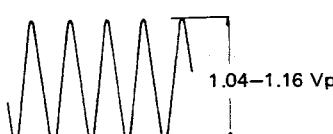
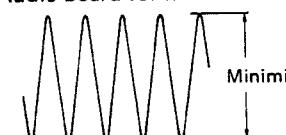
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	CTL Amp. DC SET-2	TP-5 Capstan Servo	R40 (DC SET-2) CAP. SERVO	—	STOP	1. Connect a digital voltmeter to TP-5 of the Capstan servo board. 2. Adjust R40 to obtain a DC voltage of 6.0 V.
2	FG (Frequency Generator) Amp. DC SET-1	TP-1 Capstan Servo	R3 (DC SET-1) CAP. SERVO	—	STOP	1. Connect a digital voltmeter to TP-1 of the Capstan servo board. 2. Adjust R3 to obtain a DC voltage of 7.0 V.
3	Still Width	TP-7 Capstan Servo	R62 (STILL WIDTH) CAP. SERVO	—	STOP	1. Connect a digital voltmeter to TP-7 of the Capstan servo board. 2. Adjust R62 to obtain a DC voltage of 3.00 ± 0.08 V.
4	Capstan Discriminator (DC SET-3)	TP-13 Capstan Servo	R106 (DC SET-3) CAP. SERVO	Color Bar	REC	1. Connect a digital voltmeter to TP-13 of the Capstan servo board. 2. Adjust R106 to obtain a DC voltage of 5.10 V.
5	Capstan FG (Frequency Generator)	TP-1 Capstan Servo	—	Color Bar	REC	1. Connect oscilloscope to TP-1 of the Capstan servo board. 2. Confirm that the capstan FG level fluctuation becomes less than 1.2 between a and b.
						 $b \text{ (Max. level)} / a \text{ (Min. level)} \leq 1.2$
6	P.B. CTL Level	TP-6 Capstan Servo	—	MH-1 Stairstep	P.B.	1. Connect oscilloscope to TP-6 of the Capstan servo board. 2. Set the tracking VR at the center click position. 3. Confirm that the P.B. CTL level becomes $0.3 - 1.2$ Vp-p and $t_1 < t_2$.
						
7	Sub. Tracking Adj.	TP-6 Capstan Servo	R112 (SUB TRACKING) CAP. SERVO	Color Bar	REC ↓ P.B.	1. Supply a color bar signal to VIDEO IN. 2. Connect the oscilloscope to VIDEO IN and VIDEO OUT. At the dual trace mode, synchronize the signals at the decay point of V. sync waveform of the VIDEO INPUT signal. 3. Set the tracking control to the center click position. 4. Adjust R112 so that VIDEO OUT playback signal will delay 2 μ sec than the VIDEO IN signal. 5. Connect VIDEO IN oscilloscope to TP-6 of the Capstan servo board. 6. Connect the oscilloscope to TP-17 of the Drum servo board and trigger the oscilloscope externally (- slope).

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
						<p>7. Confirm that the CTL pulse at TP-6 of the Capstan servo board is near the V. sync of the VIDEO OUT signal.</p>
8	Drum Search	TP-26 Drum Servo	R18 Capstan Servo (x10 DRUM SERVO)	—	FWD ↓ STILL ↓ SER. REV. (1/15)	<p>1. Turn R22 fully counterclockwise from parts mounted side of the circuit board.</p> <p>2. Connect a frequency counter to TP-26 of the Drum servo board.</p> <p>3. During forward, set for the Still mode.</p> <p>4. Adjust R18 to obtain a frequency of 1907 Hz ± 1 Hz.</p> <p>5. Set Playback mode and SER. REV. control to 1/15 speed.</p> <p>6. Adjust R22 to obtain a frequency of 1907 Hz ± 1 Hz.</p>
9	Capstan REC Phase	TP-12 Capstan	R90 Capstan Servo (CAP. REC PHASE)	Color Bar	REC ↓ PAUSE ↓ REC	<p>1. Connect oscilloscope to TP-12 of the Capstan servo board.</p> <p>2. Trigger the oscilloscope externally (— slope) with signal from TP-17 of the Drum servo board.</p> <p>3. During recording, set for the Pause mode, then, press the PAUSE button.</p> <p>4. When the unit switches from playback to recording, check the fluctuation of the waveform.</p> <p>5. If the fluctuation is out of the range 14.0 ± 1.5 msec, adjust R90 (CAP. REC PHASE), then repeat steps 3 to 5.</p>

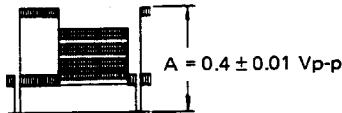
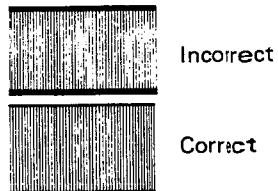
3.8 AUDIO CIRCUIT

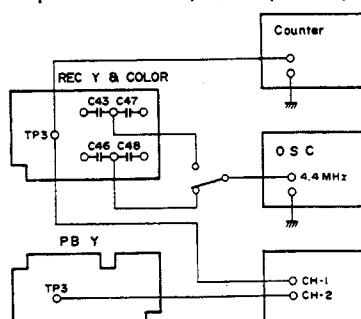
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	E-E Level	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	AUDIO Level Volume	400 Hz -30 dBs (0.07 Vp-p)	E-E	<p>1. Supply a 400 Hz -30 dB audio input signal to LINE IN and set the audio input level switch to -20 dB. 2. Set the NR switch and Limiter switch to OFF. 3. Without load, turn the Audio volume controls fully clockwise. 4. Confirm that the audio output level becomes -6 ± 2 dBs (0.9 V - 1.4 Vp-p).</p>  <p>Confirm a difference between CH-1 and CH-2 of within 2 dB.</p>
2	Level Meter	Level Meter	R180 CH-1 R182 CH-2 Audio	400 Hz -20 dBs (0.22 Vp-p) to AUDIO IN	E-E	<p>1. Supply a 400 Hz -20 dBs audio input signal to LINE IN and set the audio output level switch to -20 dB. 2. Connect oscilloscope to LINE OUT (TP-12 CH-1, TP-13 CH-2). 3. Without load, adjust the audio level controls of the front panel to obtain -6 dBs (1.1 Vp-p). 4. Adjust R180 (CH-1 Meter) and R182 (CH-2 Meter) of the Audio Amp board to obtain 0 dB indications on the level meters.</p> 
3	Limiter Operation	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	-	400 Hz -10 dBs (0.7 Vp-p)	E-E	<p>1. Supply a 400 Hz -10 dBs audio input signal to AUDIO IN and set limiter switches to ON. 2. Set the audio input level switch to -20 dB and the NR switch to OFF. 3. Confirm that the audio output levels with no load are -2.5 ± 1 dBs. 4. Set Limiter switches to OFF. 5. Confirm that the audio output levels with no load are 4 dB, and difference between CH-1 and CH-2 is within 1 dB.</p>
4	Playback Level	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	R9 CH-1 R70 CH-2 Audio	MH-1 1 kHz	P.B.	<p>1. Set the NR switch to OFF. 2. At 1 kHz 0 dB playback, adjust R9 (CH-1 P.B. LEVEL) and R70 (CH-2 P.B. LEVEL) to obtain audio output levels with no load of $-8 \text{ dB} \pm 0.2$ dB (0.85-0.89 Vp-p).</p> 

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform								
5	Audio Monitor Level	Monitor OUT or Pin 1 of CN17	—	MH-1 1 kHz	P.B.	<p>1. Play 1 kHz signal of MH-1 tape. 2. Set the NR switch to OFF and audio input switch to -20 dB position. 3. Set the audio monitor switch to AUDIO-1 (CH-1) and without load, check for 0 dB ± 1.0 dB (1.9–2.4 Vp-p) audio output level.</p>  <p>4. In the same manner, check AUDIO-2 (CH-2) and pin 1 of the TV connector.</p>								
6	Full Erase Voltage	TP-14 Audio	—	—	REC	<p>1. Connect the digital voltmeter to TP-14 of the Audio board. 2. Confirm that the Erase voltage is more than 10 V DC.</p>								
7	Audio Erase Signal	TP-15, TP-16 Audio	—	—	REC	<p>1. Connect a dual trace oscilloscope to TP-15 and TP-16 of the Audio board. 2. Check for output level of more than 27 Vp-p.</p> 								
8	P.B. Frequency Response	Monitor OUT or Pin 1 of CN17 Audio	R6 CH-1 R67 CH-2 Audio	MH-6	P.B.	<p>1. Play JVC alignment tape MH-6. 2. Set the NR switch to OFF. 3. Set the Monitor switch to CH-1 and CH-2. 4. Adjust R6 (CH-1) and R67 (CH-2) of the Audio board to obtain the frequency response shown in the Table. 5. Set the 400 Hz signal for 0 dB reference level.</p> <table border="1" data-bbox="1032 1324 1365 1459"> <thead> <tr> <th>Frequency</th><th>Level (dB)</th></tr> </thead> <tbody> <tr> <td>400 Hz</td><td>0 dB</td></tr> <tr> <td>100 Hz</td><td>+1.5 ~ -2.5 dB</td></tr> <tr> <td>10 kHz</td><td>-0.5 ~ -2.5 dB</td></tr> </tbody> </table> <p>6. If 10 kHz is insufficient, readjust R6 and R67.</p>	Frequency	Level (dB)	400 Hz	0 dB	100 Hz	+1.5 ~ -2.5 dB	10 kHz	-0.5 ~ -2.5 dB
Frequency	Level (dB)													
400 Hz	0 dB													
100 Hz	+1.5 ~ -2.5 dB													
10 kHz	-0.5 ~ -2.5 dB													
9	Bias Level	TP-4 CH-1 TP-5 (GND) TP-9 CH-2 TP-10 (GND) Audio	R183 (CH-1 BIAS) R184 (CH-2 BIAS) Audio	—	REC	<p>1. Connect an oscilloscope to TP-4/TP-5 (GND) CH-1 or TP-9/TP-10 (GND) CH-2 of the Audio board. 2. Adjust R183 (CH-1 BIAS LEVEL) and R184 (CH-2 BIAS LEVEL) of the Audio board to set the bias levels for 4.2 mVrms.</p> 								
10	P.B. Noise Reduction	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	—	MH-6 10 kHz	P.B.	<p>1. Play JVC alignment tape MH-6, 10 kHz. 2. Connect an oscilloscope to AUDIO OUT. 3. Without load, confirm that the output level becomes -7 ± 1.5 dB between Audio NR switch OFF and Audio NR switch ON.</p>								

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform								
11	Audio REC Level	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	R12 CH-1 R73 CH-2 Audio	400 Hz -20 dBs (0.22 Vp-p) to AUDIO IN	REC ↓ P.B. ↓ REC ↓ P.B.	<p>1. Supply a 400 Hz -20 dBs audio input signal to AUDIO IN and set the NR switch to OFF.</p> <p>2. During the Recoding mode adjust R12 (CH-1 REC LEVEL) and R73 (CH-2 REC LEVEL) of the Audio board.</p> <p>3. Confirm that the audio output level with no load is -6 ± 0.5 dB (1.04 – 1.16 Vp-p) when Playback mode.</p> <p>4. If audio output level is insufficient, readjust REC LEVEL VR (R12 and R73).</p> 								
12	REC/P.B. Frequency Response	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	R13 CH-1 R74 CH-2 Audio	400 Hz, 20 Hz, 12 kHz -40 dBs (0.022 Vp-p)	REC ↓ P.B.	<p>1. Supply audio input signal of 400 Hz, 20 Hz and 12 kHz at -40 dBs to LINE IN.</p> <p>2. Without load, set the NR switch to ON and the audio input level switch to -20 dB.</p> <p>3. Adjust R13 (CH-1) and R74 (CH-2) of the Audio board to obtain the frequency response shown in the Table.</p> <p>4. Set the 400 Hz signal for 0 dB reference level.</p> <table border="1" data-bbox="873 1055 1206 1189"> <thead> <tr> <th>Frequency</th> <th>Level (dB)</th> </tr> </thead> <tbody> <tr> <td>400 Hz</td> <td>0 dB</td> </tr> <tr> <td>20 Hz</td> <td>-1 ~ -7 dB</td> </tr> <tr> <td>12 kHz</td> <td>0.5 ~ -4.5 dB</td> </tr> </tbody> </table> <p>5. If 12 kHz is insufficient, readjust R13 and R74 and confirm CH-1 and CH-2 level difference is within 3 dB.</p> <p>6. If still difficult to adjust per above 5, change the bias level to $4.2 \text{ mV} \pm 0.5 \text{ mV}$ and if 12 kHz level is higher than the spec., change the bias level to higher side and if not to lower side.</p>	Frequency	Level (dB)	400 Hz	0 dB	20 Hz	-1 ~ -7 dB	12 kHz	0.5 ~ -4.5 dB
Frequency	Level (dB)													
400 Hz	0 dB													
20 Hz	-1 ~ -7 dB													
12 kHz	0.5 ~ -4.5 dB													
13	Crosstalk Cancel	LINE OUT or TP-12 CH-1 TP-13 CH-2 Audio	R51 CH-1 R113 CH-2 Audio	3 kHz -20 dBs (0.22 Vp-p)	CH-1 P.B.	<p>1. Supply 3 kHz -20 dBs audio input signal to LINE IN. During Play with no signal tape, set A-DUB switch to CH-1 insert mode.</p> <p>2. Connect the oscilloscope to TP-13 (CH-2) of the Audio board.</p> <p>3. Adjust R113 (CH-2 CROSSTALK CANCEL) of the Audio board for minimum CH-2 level.</p> 								
					CH-2 P.B.	<p>1. Supply 3 kHz -20 dBs audio input signal to LINE IN (CH-2). During Play with no signal tape, set A-DUB switch to CH-2 insert mode.</p> <p>2. Connect the oscilloscope to TP-12 (CH-1).</p> <p>3. Adjust R51 (CH-1 CROSSTALK CANCEL) of the Audio board for minimum CH-1 level.</p>								

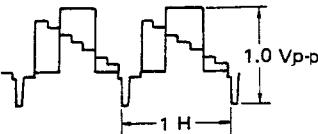
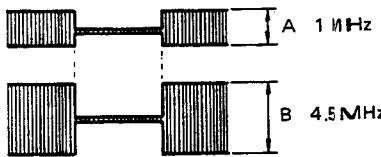
3.9 VIDEO CIRCUIT

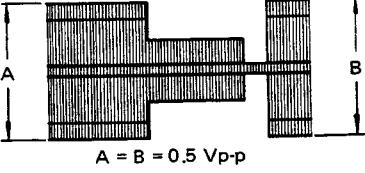
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	AGC	TP-2 REC Y & COLOR	R35 (AGC LEVEL) REC Y & COLOR	Color Bar	E-E	<p>1. Supply a color bar signal to VIDEO IN. 2. Connect the oscilloscope to TP-2 of REC Y & COLOR board. 3. Adjust R35 (AGC LEVEL SET) of the REC Y & COLOR board to obtain 0.4 ± 0.01 Vp-p.</p> 
2	Carrier Bal.	Pin 9 of IC2 REC Y & COLOR	R21 (CAR. BAL.) REC Y & COLOR	No Signal	E-E	<p>1. Disconnect video input signal and connect both CH-1 and CH-2 inputs of a dual trace oscilloscope to pin 9 of IC2 on the REC Y & COLOR board.</p> <p>2. Invert one channel (CH-2) and set oscilloscope to the ALT. mode. Adjust the vertical gain of the oscilloscope to obtain the same level for CH-1 and CH-2, and set the oscilloscope to GND and adjust the vertical position of the oscilloscope of CH-1 and CH-2 until the two lines become single line.</p> <p>3. Set the oscilloscope to AC and adjust R21 CARRIER BAL.) of the REC Y & COLOR board so that the double line of the top and bottom become single line as shown in the figure.</p> 
3	Carrier and Deviation	TP-3 REC Y & COLOR	C14 (CAR- RIER) R44 (COL. DEV.) R45 (B/W DEV.)	Color Bar	E-E/ AUTO	<p>1. Disconnect video input signal and set for the E-E/AUTO mode.</p> <p>2. Connect a frequency counter to TP-3 of the REC Y & COLOR board.</p> <p>3. Adjust C14 (CARRIER SET) of the REC Y & COLOR board for 3.4 MHz.</p> <p>4. Supply a color bar input signal to VIDEO IN.</p> <p>5. Set generator for 4.4 MHz and connect it between C46 and C48 of the REC Y & COLOR board.</p> <p>6. Connect a dual trace oscilloscope to TP-3 of the REC Y & COLOR board for CH-1 and TP-3 of the P.B. Y board for CH-2.</p> <p>7. Set the oscilloscope to ADD mode and adjust R44 of signal input gain for easy observation of beat.</p> <p>8. Adjust R44 to get the deviation as shown.</p> <p>9. Connect a 220Ω (1 W) resistor between TP-5 of the REC Y & COLOR board and chassis.</p>



Note: Before adjustment, turn R15 (DARK CLIP) and R12 (WHITE CLIP) fully clockwise so that the signal is not limited.

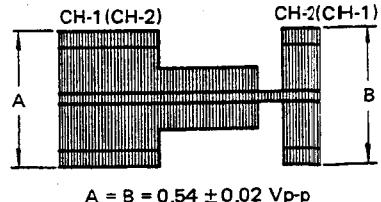
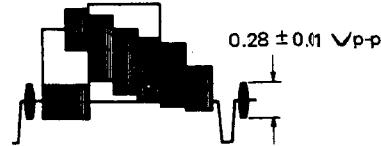
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
3						<p>10. Set the oscillator frequency to 4.4 MHz and supply this signal to the point where C43 and C47 are connected on the REC Y & COLOR board.</p>
4	AFC	TP-11 REC Y & COLOR	R107 (AFC) REC Y & COLOR	Color Bar	E-E	<ol style="list-style-type: none"> Supply a color input signal to VIDEO IN. Connect the oscilloscope and digital voltmeter to TP-11 of the REC Y & COLOR board. Adjust R107 (AFC) and lock the waveform of the oscilloscope. Adjust R107 to get DC voltage of 4.75 ± 0.05 V.
5	VXO	TP-9 REC Y & COLOR	C96 (VXO) REC Y & COLOR	Color Bar	E-E	<ol style="list-style-type: none"> Supply a color input signal to VIDEO IN. Connect the oscilloscope and digital voltmeter to TP-9 of the REC Y & COLOR board. Adjust C96 (VXO) and lock the waveform of the oscilloscope. Adjust C96 to get DC voltage of 5.78 ± 0.02 V.
6	Burst Gate Pulse	TP-6, TP-13 REC Y & COLOR	L23, L25 REC Y & COLOR	Color Bar	E-E	<ol style="list-style-type: none"> Supply a color bar signal to VIDEO IN. Connect the oscilloscope to TP-6 and TP-13 of the REC Y & COLOR board. Adjust in the core of L25 and confirm the burst gate pulse width of 2.8–3.6 sec at DC voltage of 2.5 V. Note: Treat L25 coil carefully as easily to break. Adjust L23 to get the burst signal to the center of the gate pulse at 2.5 V DC.
7	White and Dark Clip	TP-1 REC Y & COLOR	R12 (WHITE CLIP) R15 (DARK CLIP) REC Y & COLOR	Color Bar	E-E	<ol style="list-style-type: none"> Supply a color bar signal to VIDEO IN. Connect the oscilloscope to TP-1 of the REC Y & COLOR board. As shown in the Figure adjust R12 (WHITE CLIP) and R15 (DARK CLIP). <p>$A : B : C = 4 : 3.4 \pm 0.2 : 2.0 \pm 0.2$</p>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
8	P.B. Y Level	VIDEO OUT or TP-6 P.B. Y	R27 (COL. VIDEO LEVEL) P.B. Y	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar signal to VIDEO IN. 2. With load at 75Ω, connect the oscilloscope to VIDEO OUT (TP-6) of the P.B. Y board. 3. Adjust R27 (E-E Y LEVEL) of the P.B. Y board to obtain 1.0 Vp-p.</p> 
			R28 (B/W VIDEO LEVEL)	Gray Scale	P.B. AUTO	<p>1. Record and play the gray scale signal. 2. Adjust R28 for video level of 1.0 Vp-p with the same procedure as before.</p>
9	REC FM Level	TP-1 Pre/Rec.	R2 (REC FM Pre/Rec.)	Color Bar	REC	<p>1. Supply a color bar signal to VIDEO IN. 2. Connect the oscilloscope to TP-1 of the Pre/Rec. board and trigger the oscilloscope externally with the signal from TP-17 of the Drum servo board. 3. Adjust R2 (REC FM LEVEL) to obtain 4.4 Vp-p.</p> 
10	Video Head Resonance and Q (Quality Factor) (Using signal generator)	TP-6 Pre/Rec.	R71 CH-1(Q) C29 CH-1(F_0) TP-2 R59 CH-2(Q) C30 CH-2(F_0) TP-3 Pre/Rec.	Signal Generator 1 MHz and 4.5 MHz	P.B. Normal	<p>Note: The adjustment is required only after replacing the upper drum (video heads).</p> <p>1. Connect the oscilloscope to TP-6 on the Pre/Rec. board. 2. Trigger the oscilloscope externally with the signal from TP-17 of the Drum servoboard. 3. Play with blank tape.</p>  <p>CH-1 Resonance and Q</p> <p>1. Supply 1 MHz signal to TP-2 of the Pre/Rec. board and adjust signal generator level so that amplitude of the signal A becomes 0.2 Vp-p as shown in the Figure. 2. Set the generator for 4.5 MHz. 3. Adjust C29 (NOR F1) for maximum signal amplitude. 4. Adjust R71(NOR Q1) so that amplitude of the signal B is 3 times (9.5 dB) that of the 1 MHz signal as shown in the Figure.</p>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
10						<p>CH-2 Resonance and Q</p> <p>1. Similarly, perform adjustment for CH-2. Supply 1 MHz signal to TP-3 of the Pre/Rec board and adjust Resonance with C30 (NOR. F2) and CH-2 Q with R59 (NOR. Q2).</p>
	TP-7 Pre/Rec.	R115 CH-1 (Q) C73 CH-1(F_0) TP-10 R103 CH-2 (Q) C74 CH-2(F_0) TP-11 Pre/Rec.	Signal Generator 1 MHz, 4.5 MHz	STILL	Note: Set for Still mode. CH-1 Resonance and Q C73 (SEA F1) R115 (SEA Q1)	 CH-2 Resonance and Q C74 (SEA F2) R103 (SEA Q2)
11	P.B. Color Channel Balance and Level	TP-14 Pre/Rec.	R65 (NOR. COL. BAL.) R126 (P.B. COL.) Pre/Rec.	MH-1 Color Bar	P.B.	<p>1. Play JVC alignment tape MH-1 color signal.</p> <p>2. Connect the oscilloscope to TP-14 of the Pre/Rec. board.</p> <p>3. Trigger the oscilloscope externally with the signal from TP-17 of the Drum servo board.</p> <p>4. Adjust R65 (NOR. COLOR BAL.) of the Pre/Rec. board to align the CH-1 and CH-2 levels.</p>  <p>5. Adjust R126 (P.B. LEVEL) of the Pre/Rec board for a waveform level of 0.5 Vp-p.</p>
		R110 (SEA COL. BAL.) Pre/Rec.	MH-1 Color Bar	STILL	1. Set Still mode of minimum noise bar observation. 2. Adjust R110 (SEC COLOR BALANCE) of the Pre/Rec. board to align the CH-1 and CH-2 levels.	
12	FM Equalizer (Normal frequency characteristic)	TP-9, TP-6 Pre/Rec.	R76 (FM EQ) L11 Pre/Rec.	—	P.B.	<p>1. Supply a sweep signal of approx. 1 Vp-p to TP-6 and connect the oscilloscope to TP-9.</p> <p>2. Adjust R76 (FM EQ) to obtain maximum Q at TP-9.</p> <p>3. Confirm resonance frequency of 3.8 ± 0.1 MHz. If the frequency differs, adjust by L11.</p>
	TP-6 P.B. Y	R76 (FM EQ) R71 (NOR. Q1) R59 (NOR Q2) Pre/Rec.	Color Sweep MH-6	P.B.	1. Play JVC alignment tape MH-6. 2. Connect the oscilloscope to TP-6 of the P.B. Y board. Trigger the oscilloscope externally with signal from TP-17 of the Drum servo board. 3. Check the frequency response of CH-1 and CH-2 and with the lower frequency response signal, adjust R76 to obtain -2.5 dB of 2 MHz level.	

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
12		TP-6 P.B. Y	R103 (SEA Q2) R115 (SEA Q1) Pre/Rec.	Color Sweep MH-6	STILL	<p>4. Adjust the 2 MHz level of higher frequency response channel to that of lower channel. If CH-1 is higher, adjust R71 and if CH-2 is higher, adjust R59.</p> <p>1. Play JVC alignment tape MH-1. 2. Connect the oscilloscope to TP-6 of the P.B. Y board. Trigger the oscilloscope externally with signal from TP-1 of the Drum servo board. 3. Adjust the noise bar and align the waveform. 4. Adjust R115 for CH-1 and R103 for CH-2 and obtain -3 dB of 2 MHz frequency characteristic at TP-6 of the P.B. Y board.</p>
13	Limiter Balance	VIDEO OUT Both ends of 75 Ω load	R6 (LIMITER BAL.) R18 (CARRIER BAL.) P.B. Y	Gray Scale	REC ↓ P.B.	<p>1. Supply a gray scale signal to VIDEO IN, record and play back. 2. With load at 75 Ω, connect the oscilloscope to VIDEO OUT. 3. Trigger the oscilloscope externally with the signal from TP-17 of the Drum servo board. 4. With H. sync, adjust R6 (LIMITER BAL.), R18 (CARRIER BAL.) for minimum carrier signal leakage at Pedestal.</p>
14	AFC	TP-11 P.B. COLOR	R63 (AFC) P.B. COLOR	Color Bar	P.B.	<p>1. Play JVC alignment tape MH-1. 2. With load at 75 Ω, connect the oscilloscope and digital voltmeter to TP-11. 3. Play the tape and confirm normal color convergence. If not normal, adjust R63 (AFC). 4. Adjust R63 (AFC) for DC voltage of 4.75 V.</p>
15	Sub. Carrier Osc.	TP-9 P.B. COLOR	C40 (SUB CARRIER OSC.) P.B. COLOR	-	E-E	<p>1. Connect a frequency counter to TP-9 of the P.B. color board. 2. Adjust C40 of the Color board to obtain 3.579545 MHz ± 10 Hz.</p>
16	VXO	TP-10 P.B. COLOR TV Monitor	C55 (VXO) P.B. COLOR	MH-1 Color Bar	P.B.	<p>1. Play JVC alignment tape MH-1. 2. Connect the oscilloscope and digital voltmeter to TP-10 of the P.B. color board. 3. Adjust C55 (VXO) and lock the waveform of the oscilloscope. 4. Adjust C55 to get DC voltage of 5.78V at TP-10.</p>
17	P.B. Color IN Level	TP-2 P.B. COLOR	R4 (P.B. COLOR IN LEVEL) P.B. COLOR	MH-1 Color Bar	P.B.	<p>1. Play JVC alignment tape MH-1. 2. Connect the oscilloscope to TP-2 of the P.B. color board. 3. Adjust R4 for 0.4 Vp-p.</p>

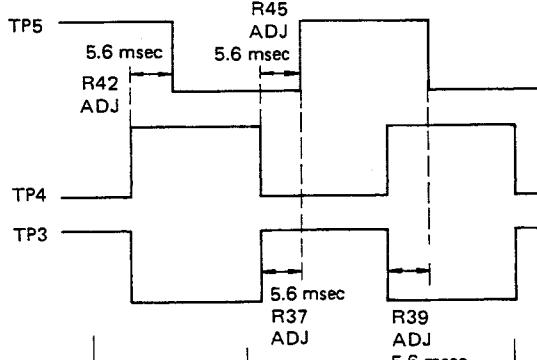
No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
18	Burst Gate Pulse	TP-6, TP-12 P.B. COLOR	L17, L18 P.B. COLOR	MH-1	P.B.	<p>1. Connect CH-1 of the oscilloscope to TP-6 and CH-2 to TP-12 of the P.B. color board.</p> <p>2. Play JVC alignment tape MH-1.</p> <p>3. Adjust in the core of L18 and confirm the burst gate pulse width of 2.8–3.6 sec at DC voltage of 2.5 V.</p> <p>Note: Treat L18 coil carefully as easily broken.</p> <p>4. Adjust L18 to position the burst gate pulse signal to the center of the burst signal at DC voltage of 2.5 V. (i.e. set to obtain $a = b$)</p>
19	Converter Balance	TP-7 P.B. COLOR	R7 (CONV. BAL.) P.B. COLOR	Color Bar	E-E	<p>1. Supply a color bar input signal to VIDEO IN, record then play back.</p> <p>2. Connect the oscilloscope to TP-7 of the P.B. color board.</p> <p>3. Trigger the oscilloscope externally with signal from TP-7 and adjust R7 (CONV. BAL.) of the Color board for minimum leakage of the 4.2 MHz component.</p>
20	Color Phase	VIDEO OUT	C20 (COL. PHASE) P.B. COLOR	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar signal to VIDEO IN.</p> <p>2. Record and play back.</p> <p>3. With load at 75Ω, connect vector scope to VIDEO OUT.</p> <p>4. Adjust the vector scope to get burst signal on $-(B-Y)$ scale.</p> <p>5. Adjust the vector scope to get magenta point on the circumference of the scale.</p> <p>6. Measure the phase position of magenta of input color bar signal and record it on the scale. Then adjust C20 (COL. PHASE) for magenta phase position of within ± 1 degree of the scale.</p> <p>Note: If the phase of input magenta signal differs, make it the same as input.</p>
21	Burst 6 dB Down	VIDEO OUT	R15(BURST DOWN) P.B. COLOR	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar input signal to VIDEO IN.</p> <p>2. With load at 75Ω, connect the oscilloscope to VIDEO OUT.</p> <p>3. Adjust R15 (BURST DOWN) for the same ratio of the burst and syan level of the playback signal as that of the input color bar signal.</p> <p>4. If burst signal level is the same, adjust the ratio of syan signal amplitude against input signal within ± 0.3 dB.</p>
22	Dub Mode Burst Level	VIDEO OUT	R13 (DUB BURST DOWN) P.B. COLOR	Color Bar	DUB	<p>1. With Dub mode, set the burst level same as item 21 at VIDEO OUT.</p> <p>2. Adjust R13 for 0.5 dB less syan signal level than explained in item 21.</p>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
23	Pulse Width	TP-13, TP-14 P.B. COLOR	R89 (PULSE WIDTH) R91 (PULSE WIDTH) P.B. COLOR	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar input signal to VIDEO IN.</p> <p>2. Connect the oscilloscope to TP-13 and TP-14 of the P.B. color board.</p> <p>3. Record and play back.</p> <p>4. Adjust R89 (PULSE WIDTH) to obtain a pulse width of 1.6 msec at TP-13.</p> <p>5. Adjust R91 (PULSE WIDTH) to obtain a pulse width of 1.6 msec at TP-14.</p>
24	Rec. Color Channel Balance and Level	TP-14 Pre/Rec.	R57 (REC COL. BAL.) R1 (REC COL.) Pre/Rec.	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar signal to VIDEO IN, record then play back.</p> <p>2. Connect the oscilloscope to TP-14 of the Pre/Rec board.</p> <p>3. Trigger the oscilloscope externally with signal from TP-17 of the Drum servo board.</p> <p>4. During recording, adjust R57 (REC COLOR BAL.) of the Pre/Rec board to align the CH-1 and CH-2 levels (i.e., adjust during recording and check during playback).</p> <p>5. Similarly during recording, adjust R1 (COLOR REC LEVEL) of the Pre/Rec board for an output level of 0.54 ± 0.02 Vp-p.</p>  <p>$A = B = 0.54 \pm 0.02$ Vp-p</p>
25	P.B. Color Level	VIDEO OUT Both ends of 75 Ω load P.B. Y	R75 (COL. LEVEL) R73 (VIDEO OUT LEVEL) P.B. Y	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar input signal to VIDEO IN, record then play back.</p> <p>2. With load at 75Ω, connect the oscilloscope to VIDEO OUT of the P.B. Y board.</p> <p>3. Adjust R73 (VIDEO OUT LEVEL) to obtain a DC voltage of 1 ± 0.02 V at both ends of 75Ω load.</p> <p>4. Adjust R75 (COL. LEVEL) of the P.B. Y board for 0.28 Vp-p of burst signal.</p>  <p>0.28 ± 0.01 Vp-p</p>
26	Tracking Meter	On the Meter	R103 (TR. METER) P.B. Y	Color Bar	REC ↓ P.B.	<p>1. Supply a color bar input signal to VIDEO IN, record then play back.</p> <p>2. Turn the tracking control and set it at the center click position.</p> <p>3. Adjust R103 to read 3.5 on the tracking meter.</p>

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
27	Aperture	VIDEO OUT TP-6 P.B. Y	R83 (APERTURE) P.B. Y	MH-6 Color Sweep	P.B.	<p>1. With load at 75Ω, connect the oscilloscope to VIDEO OUT and TP-6 of the P.B. Y board.</p> <p>2. Play JVC alignment tape MH-6.</p> <p>3. Adjust R83 for the same frequency characteristic as alignment tape at 2 MHz.</p> <p>Confirm -2.5 ± 0.5 dB at 2 MHz.</p>
28	V. Pulse Position	VIDEO OUT TP-17. Drum Servo	R55 (V. PULSE WIDTH) P.B. Y	Color Bar	P.B.	<p>1. Supply a color bar input signal to VIDEO IN, record and play back.</p> <p>2. With load at 75Ω, connect the oscilloscope to VIDEO OUT.</p> <p>3. Trigger the oscilloscope externally (- slope) with signal from TP-17 of the Drum servo board.</p> <p>4. Adjust R55 and obtain $240 \mu\text{sec}$ deviation of the V. pulse from the decay of the drum flip-flop signal.</p> <p>5. Confirm the width of the V. pulse is $280 \pm 120 \mu\text{sec}$. (If out of spec., change IC7.)</p> <p>6. Trigger the oscilloscope with + slope and confirm the same V. pulse is at the same position from decay of the drum flip-flop signal.</p>
29	Video Level Meter	Video Level Meter	R105 (V. IN LEV.) P.B. Y	Color Bar	P.B.	<p>1. Supply a color input signal to VIDEO IN.</p> <p>2. Adjust R105 to get a video meter needle position of 60 degree to the right side of the green zone of the meter.</p> <p>3. Set the AGC switch to OFF position.</p> <p>Turn the INPUT VIDEO VR on the front panel and confirm that the meter needle travels all the green zone.</p>

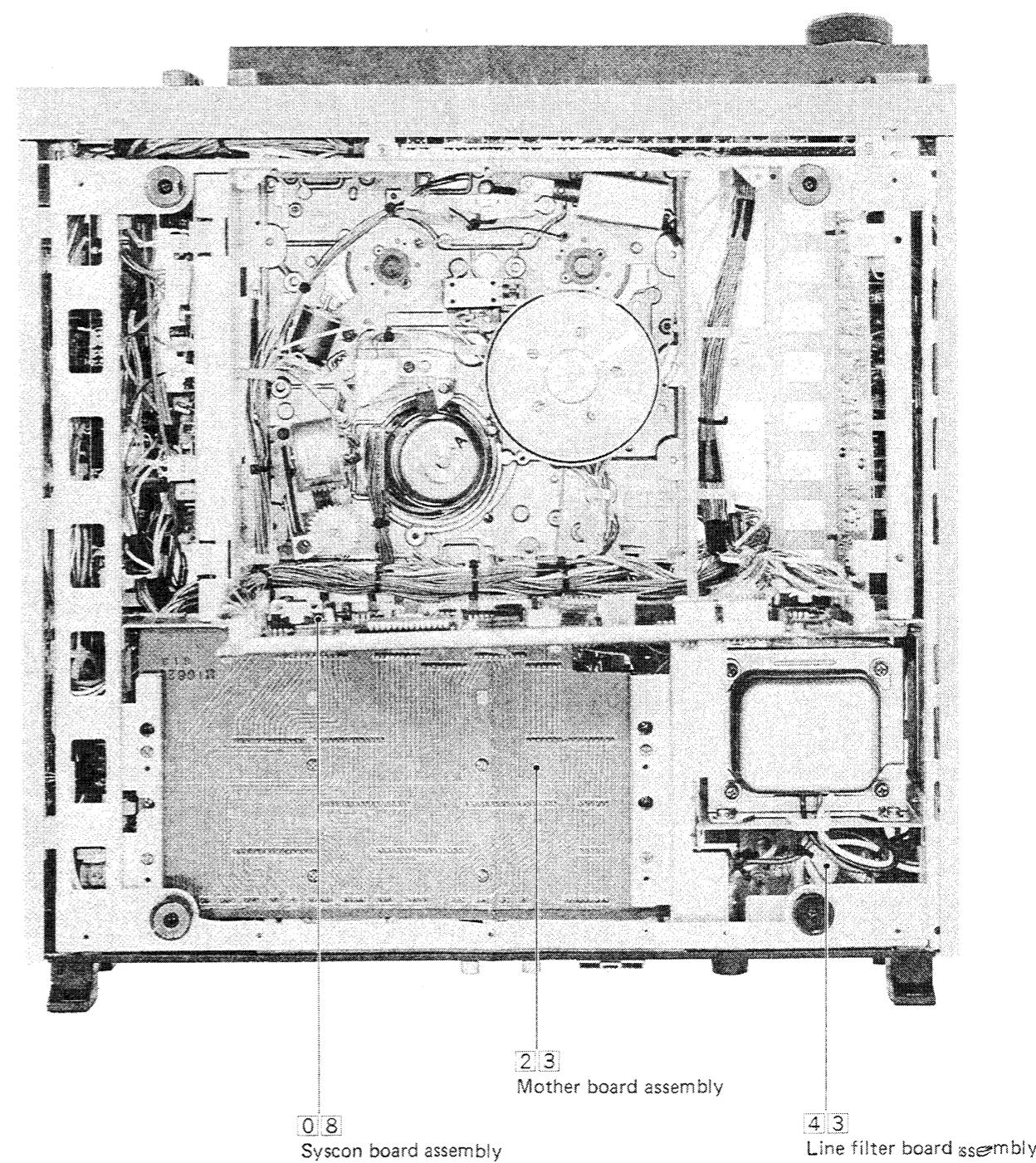
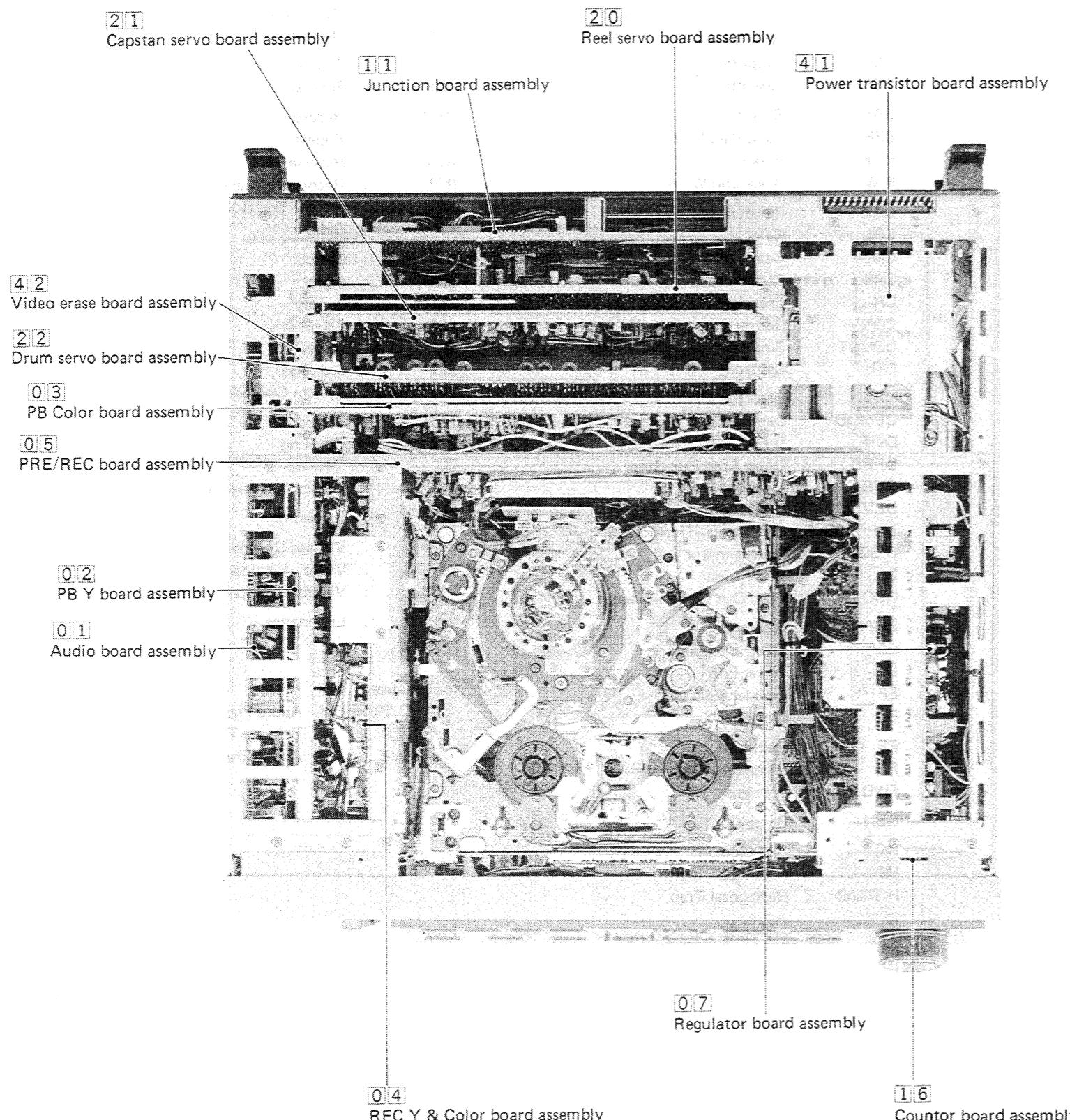
3.10 VIDEO ERASE CIRCUIT

No.	Item	Check Point	Adjustment Parts	Signal	Mode	Description and Waveform
1	Erase Output Level	TP-1, TP-2 VIDEO ERASE	R7 (CH-1 OUT LEVEL) R8 (CH-2 OUT LEVEL) Video Erase	Color Bar	VIDEO INSERT ↓ EDIT START	<p>1. Supply a color bar input signal to VIDEO IN, record then play back.</p> <p>2. Turn on the EDIT START with the Video Insert mode.</p> <p>3. Check the waveform of TP-1 and adjust R7 for 4.0 Vp-p as shown.</p>  <p>4. Similarly, adjust the TP-2 waveform by R8.</p> <p>5. Then confirm the stop of oscillation when turning on the INSERT STOP switch and to get DC waveform.</p>
2	Mono-Multi Timing	TP-4, TP-5 VIDEO ERASE	R42 (CH-1 FFH) R45 (CH-1 FFL) VIDEO ERASE	-	P.B.	<p>1. Record and then play back.</p> <p>2. Connect the oscilloscope to TP-5 and TP-4. With dual trace mode, trigger the oscilloscope externally with signal from TP-4.</p> <p>3. With the + slope, adjust R42 for 5.6 msec deviation of TP-4 signal against TP-5 as shown.</p> <p>4. With the - slope, adjust R45 for 5.6 msec deviation of TP-4 signal against TP-5 as shown.</p>
		TP-3, TP-5 VIDEO ERASE	R37 (CH-2 FFH) R39 (CH-2 FFL) VIDEO ERASE	-	P.B.	<p>1. Record and then play back.</p> <p>2. Connect the oscilloscope to TP-5 and TP-3. With dual trace mode, trigger the oscilloscope externally with signal from TP-3.</p> <p>3. With the + slope, adjust R37 for 5.6 msec deviation of TP-3 signal against TP-5 as shown.</p> <p>4. With the - slope, adjust R39 for 5.6 msec deviation of TP-3 signal against TP-5 as shown.</p>



SECTION 4 CHARTS AND DIAGRAMS

4.1 ELECTRICAL PARTS LOCATION



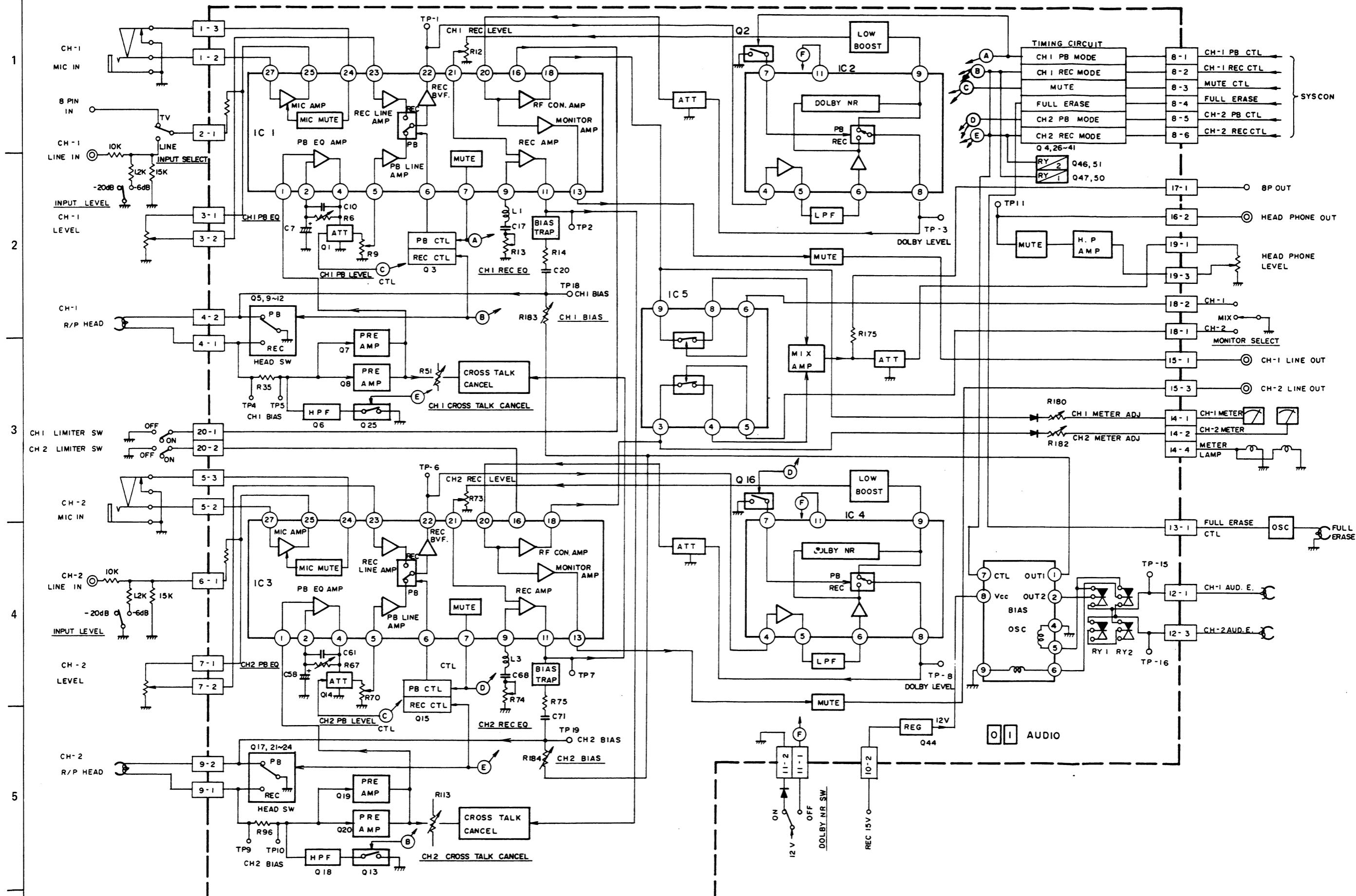
4.2 KEY TO ABBREVIATIONS

ACC	: Automatic Color Control	MOD	: Modulator
ALC	: Automatic Level Control	MON	: Monitor
AUD	: Audio	MOT	: Motor
ADD	: Adder	NOR	: Normal
AFC	: Automatic Frequency Control	OP	: Operation
AGC	: Automatic Gain Control	OSC	: Oscillator
AL	: After Loading	P.B.	: Playback
AMP	: Amplifier	PREV	: Preview
ASSEM	: Assembly	REC	: Record
BAL	: Balance	RPT	: Repeat
BPF	: Band-Pass Filter	REV	: Reverse
BRK	: Brake	R/P	: Record/Playback
B/W	: Black and White	RT	: Rotary Transformer
CAP	: Capstan	RY	: Relay
COL	: Color	S	: Search
CMD	: Command	SIG	: Signal
CAS	: Cassette	SUP.	: Supply
CH	: Channel	SOL	: Solenoid
CONV	: Converter	SW	: Switch
COUNT	: Counter	SEP	: Separator
CTL	: Control	SYSCON	: System Control
DET	: Detector	TEN	: Tension
DEMOD	: Demodulator	TR	: Tracking
D-FF	: D-Flip-Flop	TU	: Take-up
DFRS	: Drum Free Run Stop	TC	: Tension Compensate
DUB	: Dubbing	UL	: Unloading
DEV	: Deviation	VCO	: Voltage Control Oscillator
DIF TRANS	: Differential Transformer	V	: Video, Vertical
DISCRI	: Discriminator	VXO	: Variable Crystal Oscillator
DL	: Delay Line	Y	: Luminance
DOC	: Drop Out Compensator		
EMPHA	: Emphasis		
EE	: Electric to Electric		
E	: Erase, Edit		
EF	: Emitter Follower		
EQ	: Equalizer		
FE	: Full Erase		
FG	: Frequency Generator		
FWD	: Forward		
GEN	: Generator		
HG	: Hall Element		
HP	: High-Pass Filter		
H TRAP	: Horizontal Trap		
ID	: Identical		
INT	: Interrupt		
INS	: Insert		
LIM	: Limiter		
LOAD	: Loading		
LP	: Low-Pass		
LPF	: Low-Pass Filter		
LT	: Loading Tension		

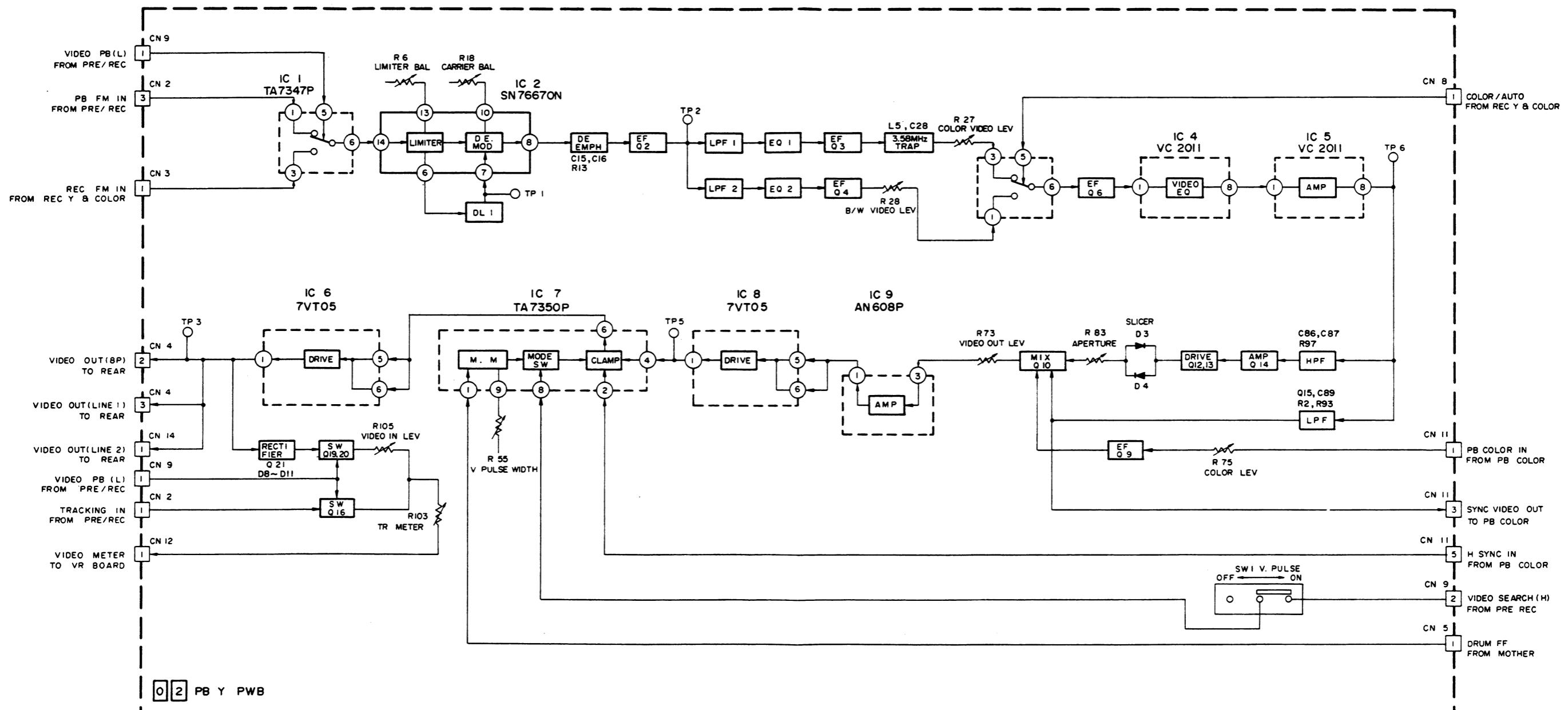
for instance:

AUD. PB. EE : Audio Playback E-E
 TU. TC : Take-up Tension Compensate
 AUD. E : Audio Erase

4.3 AUDIO BLOCK DIAGRAM

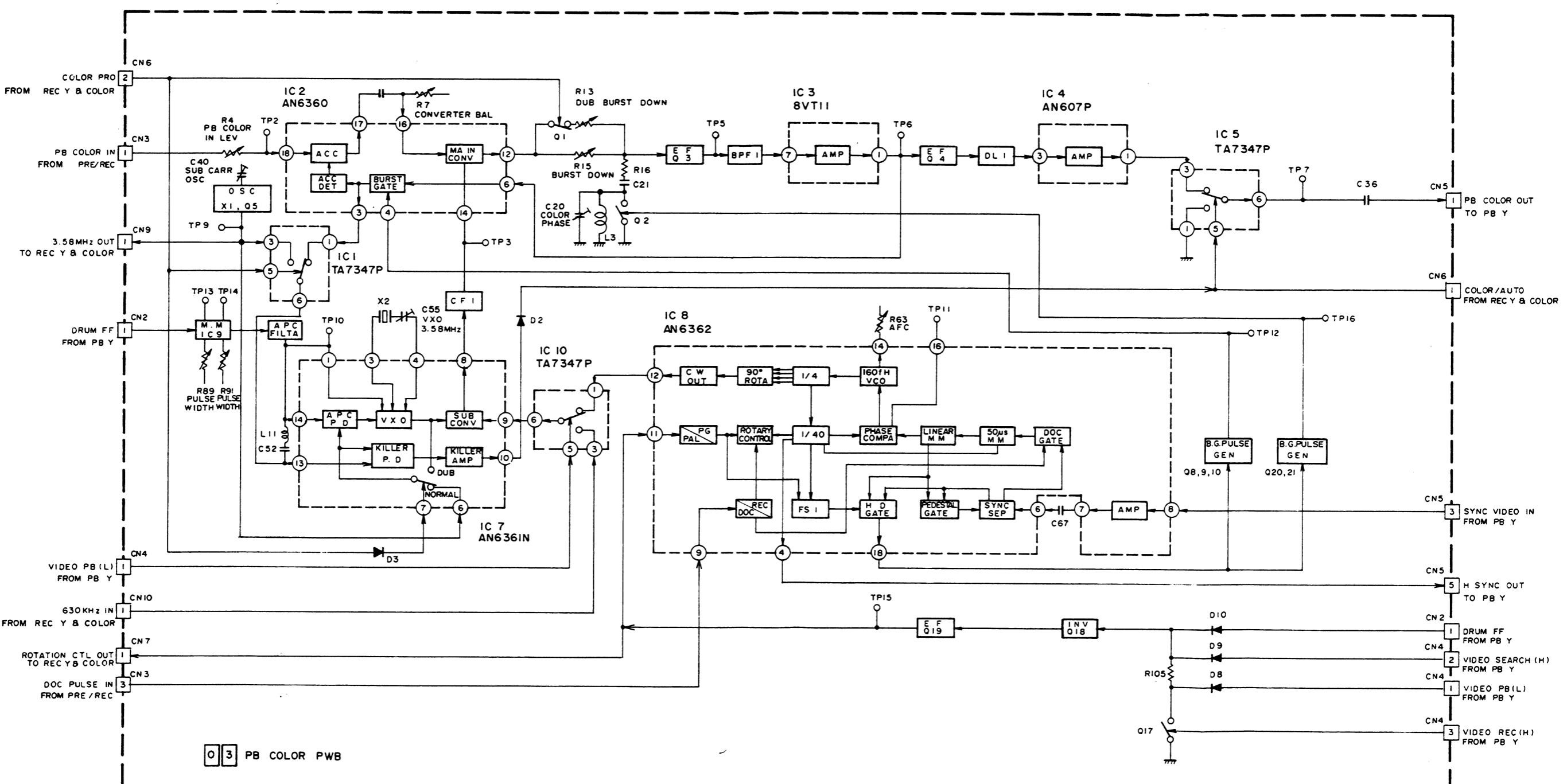


4.4 VIDEO SECTION BLOCK DIAGRAM (PB Y)

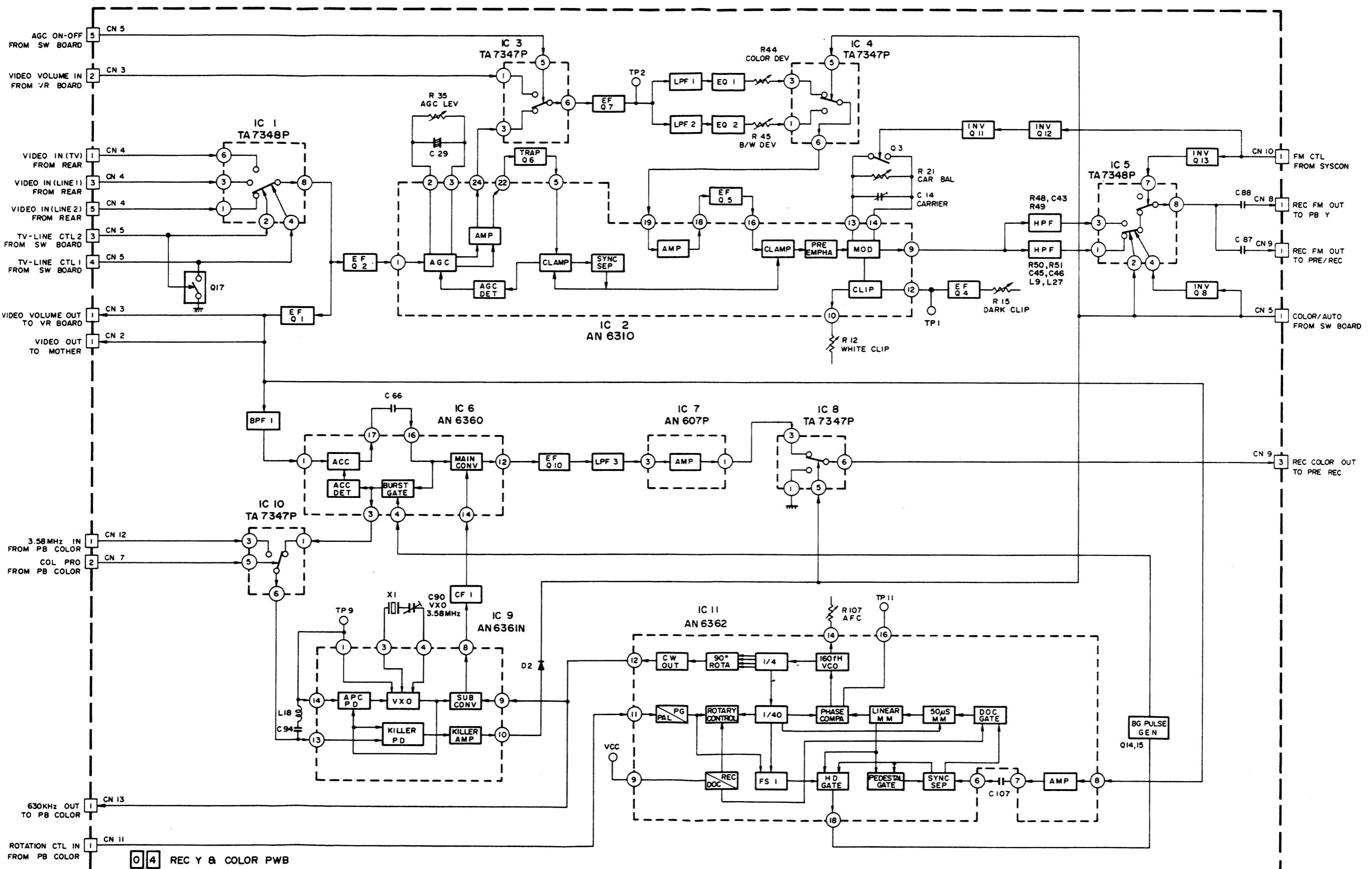


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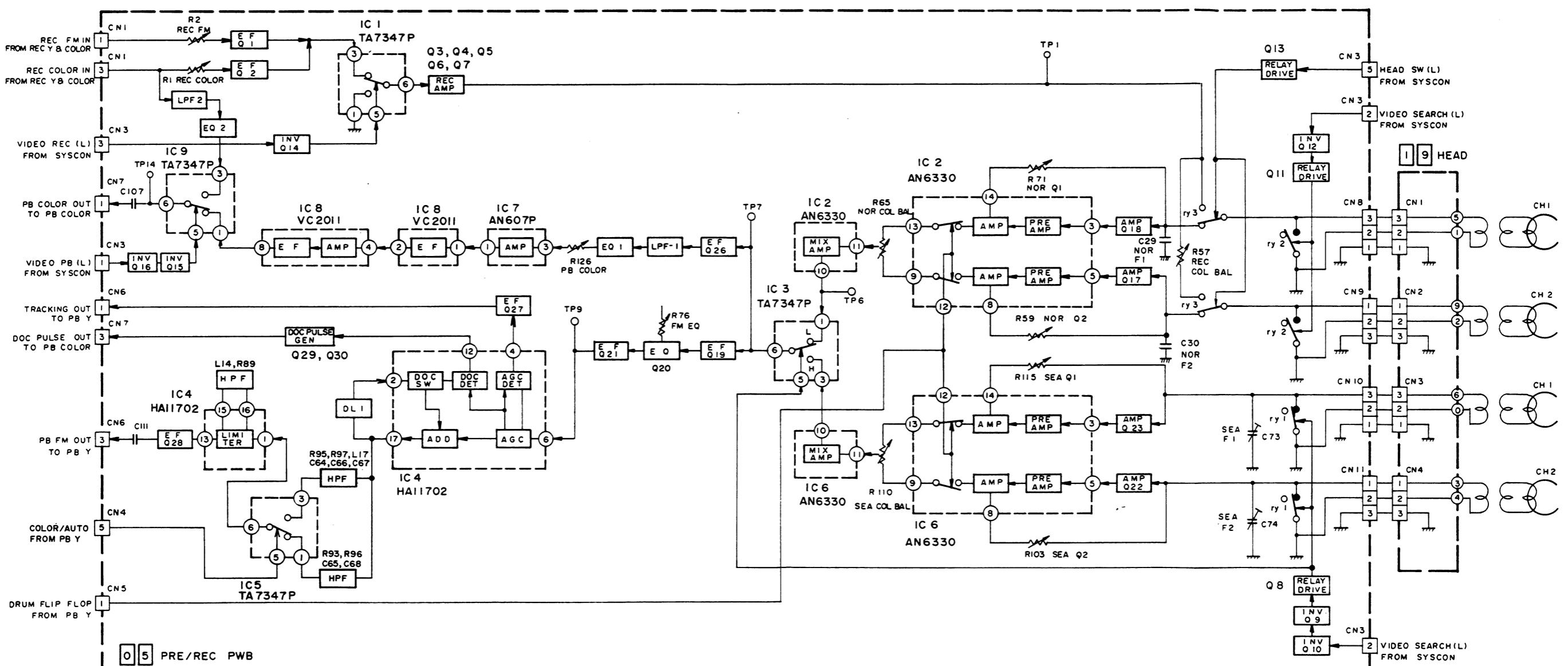
4.5 VIDEO SECTION BLOCK DIAGRAM (PB COLOR)



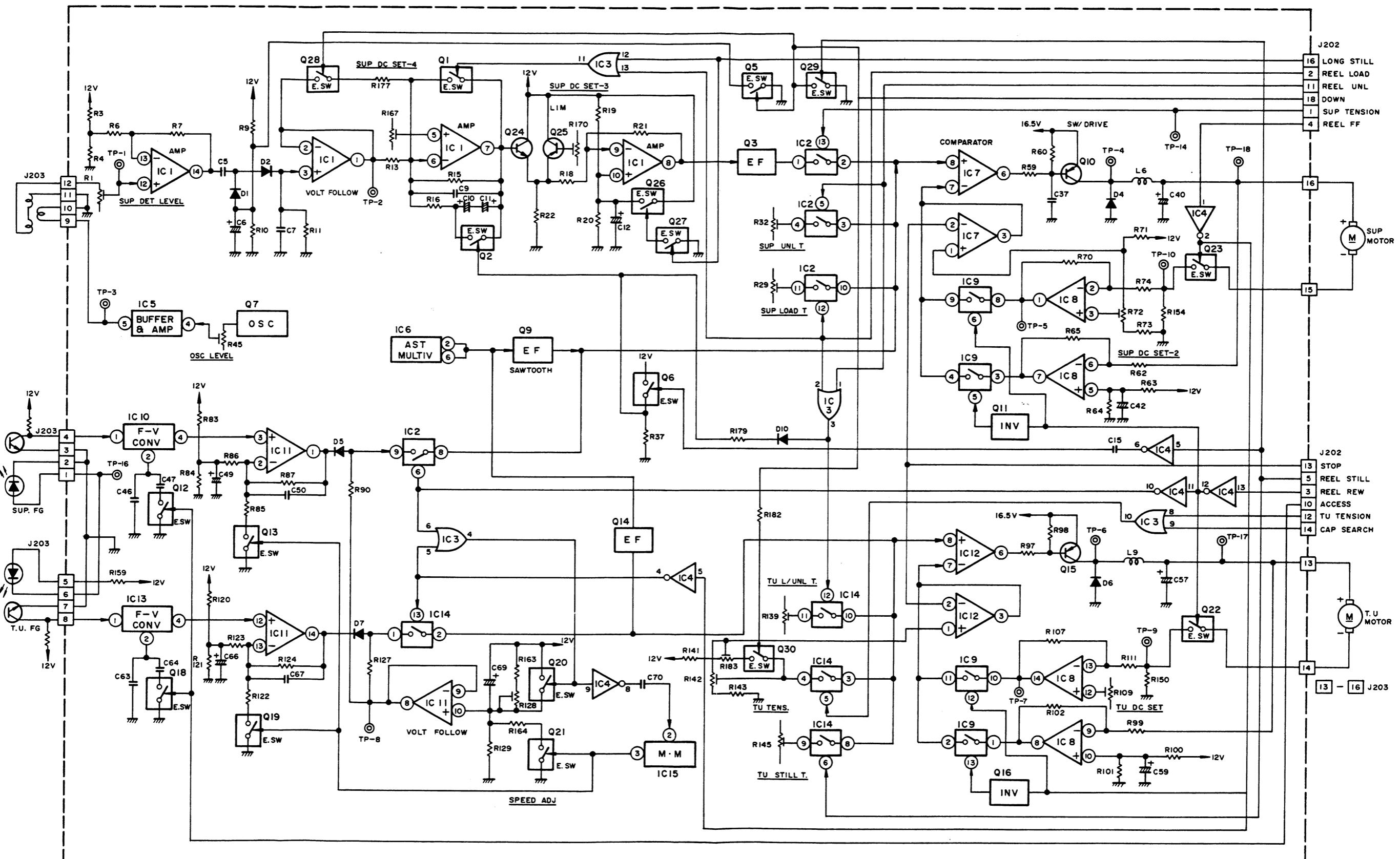
4.6 VIDEO SECTION BLOCK DIAGRAM (REC Y & COLOR)



4.7 VIDEO SECTION BLOCK DIAGRAM (PRE/REC)



4.8 REEL SERVO BLOCK DIAGRAM



A

B

C

D

E

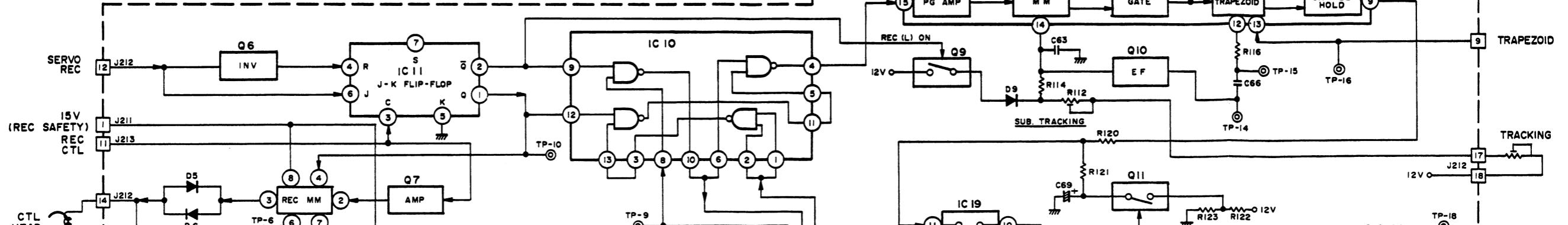
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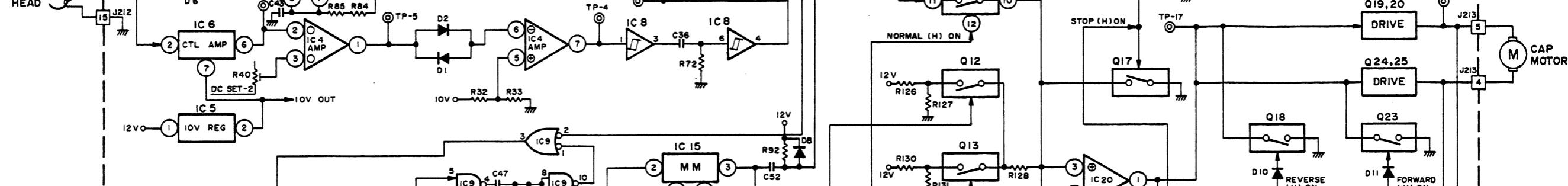
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4.9 CAPSTAN SERVO BLOCK DIAGRAM

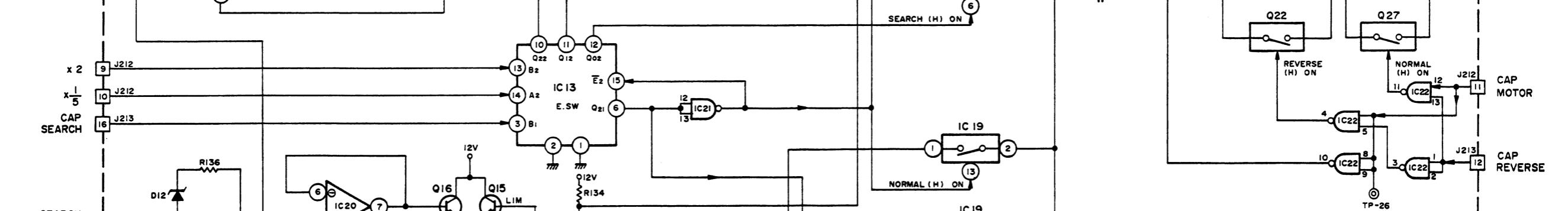
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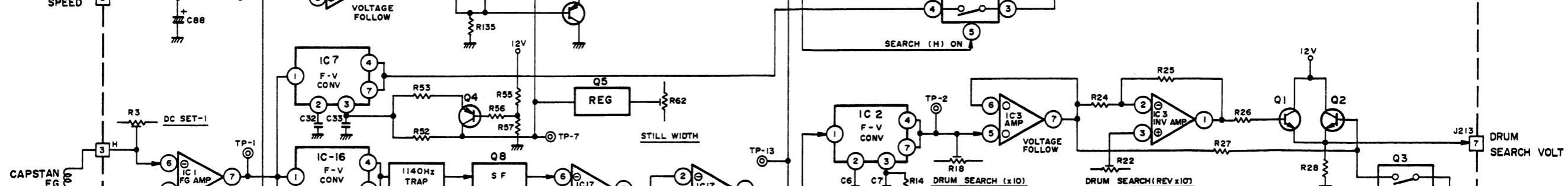
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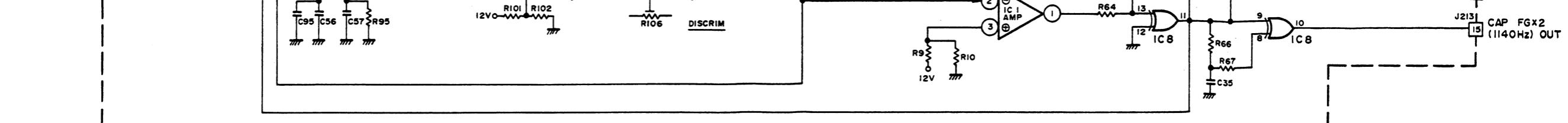
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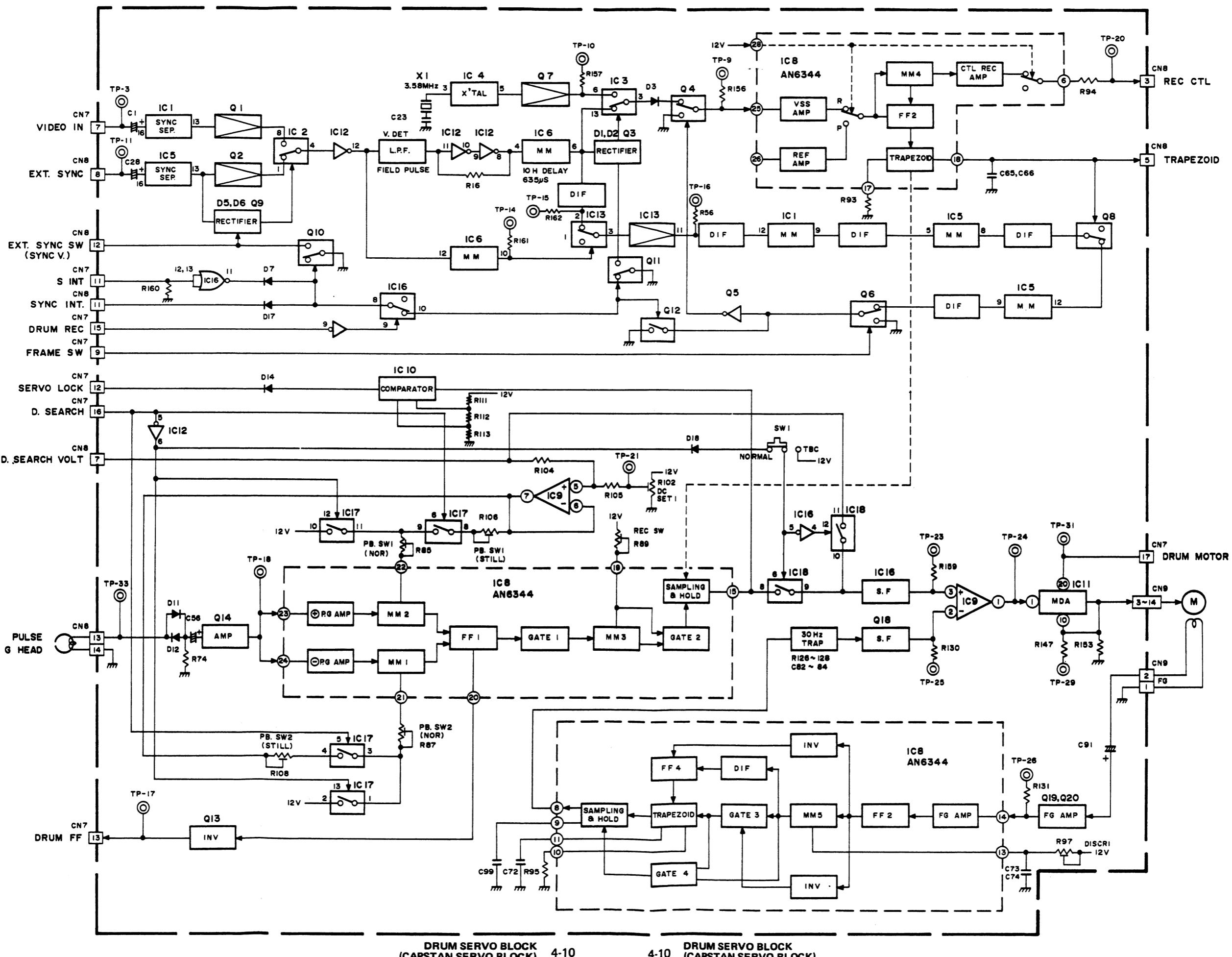
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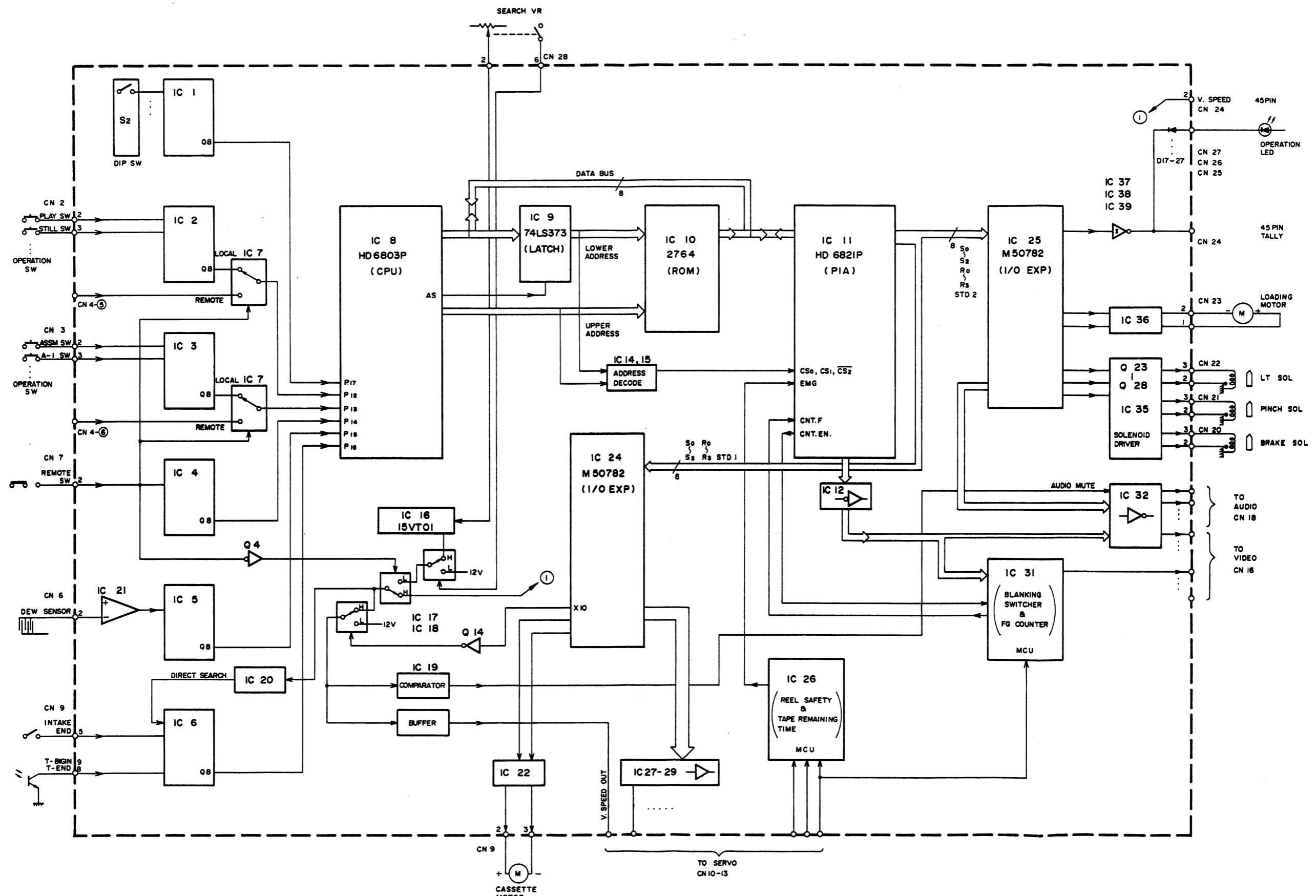
6

A | B | C | D | E | F | G | H

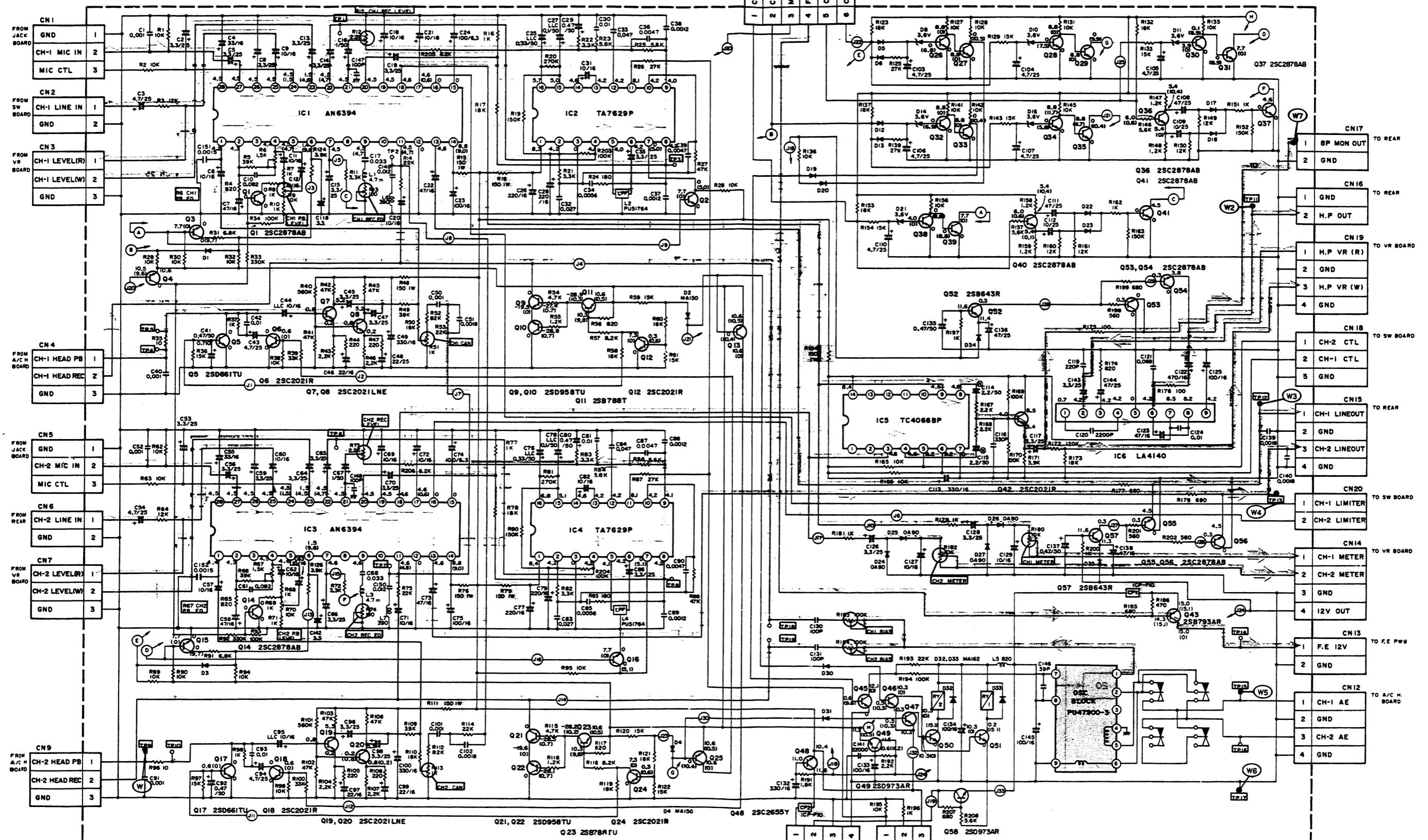
4.10 DRUM SERVO BLOCK DIAGRAM



4.11 SYSTEM CONTROL BLOCK DIAGRAM



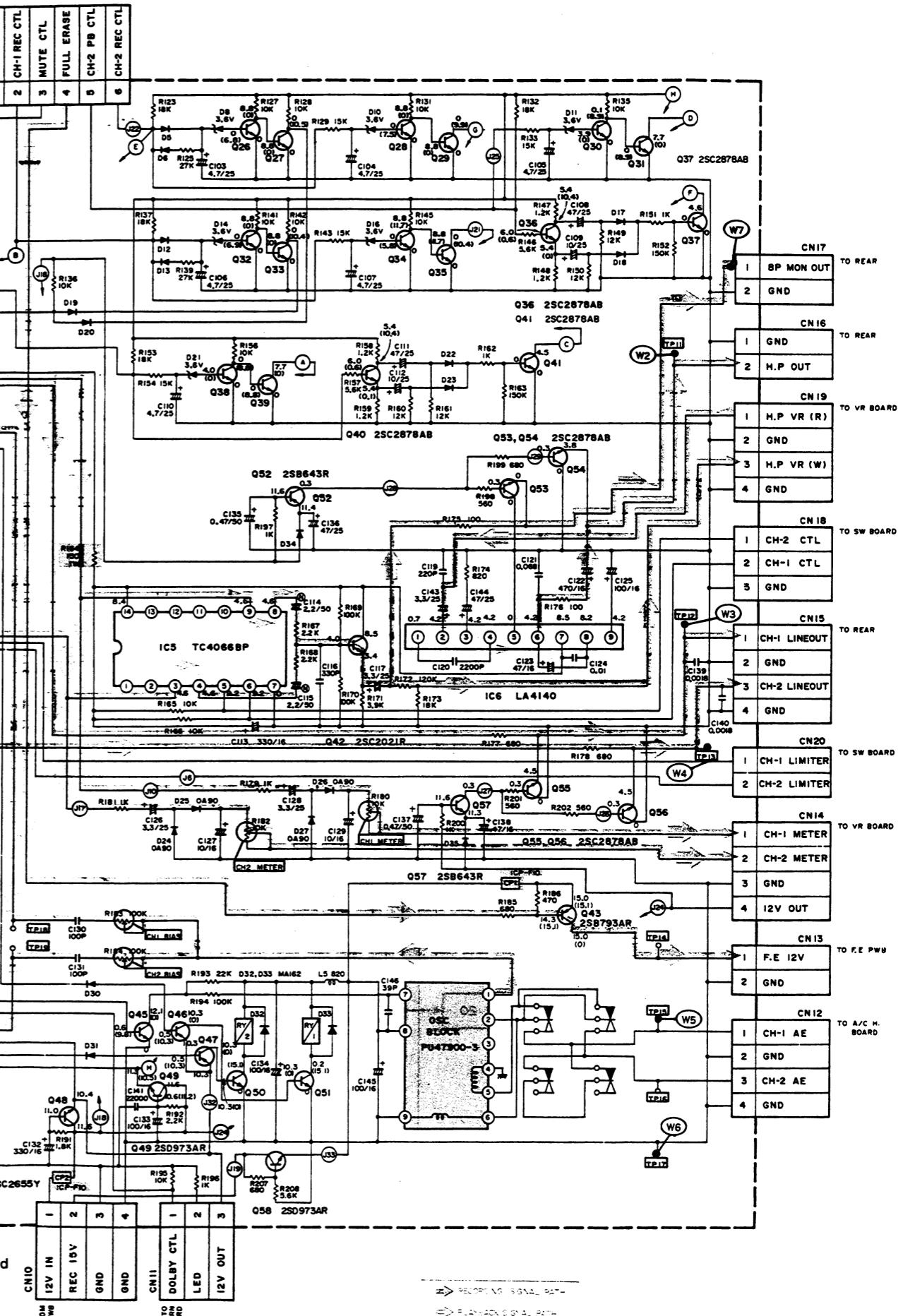
4.12 AUDIO SCHEMATIC DIAGRAM



NOTES: Unless otherwise specified;

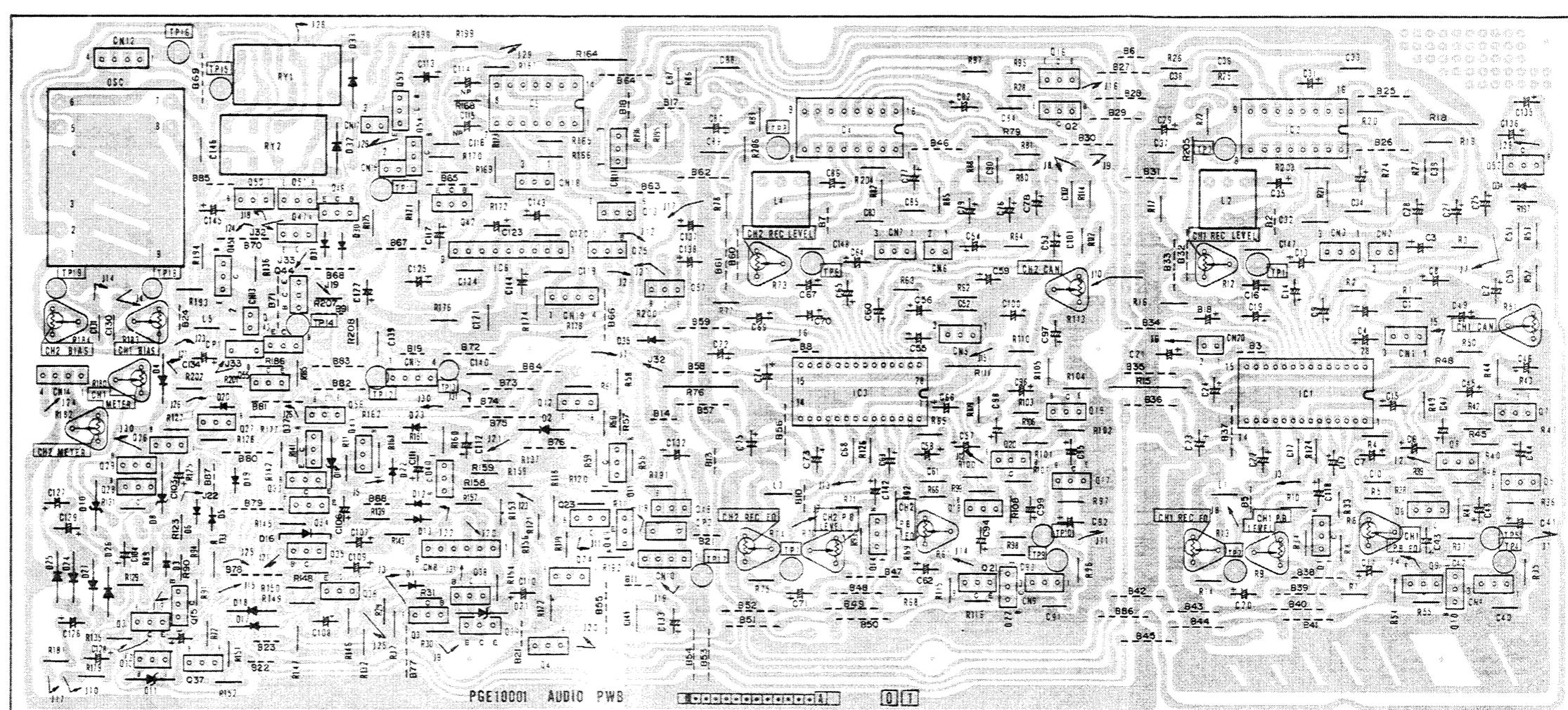
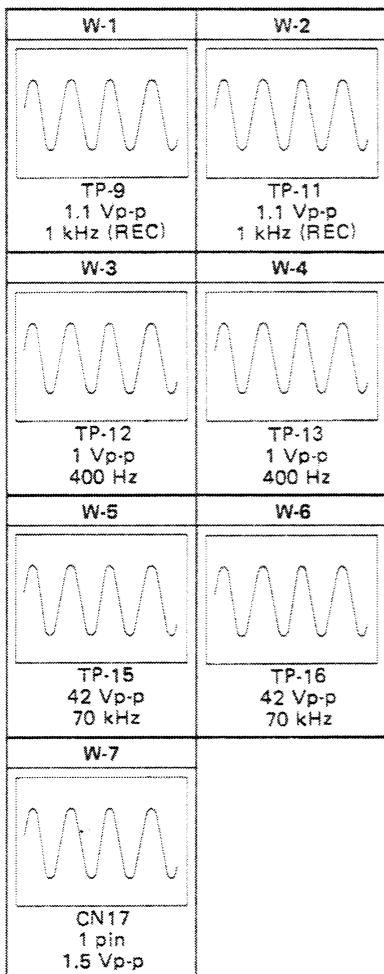
1. All resistance values are in ohms. (1/6W).
 2. All inductance values are in μ H.
 3. All capacitance values are in μ F.
 4. Voltages are DC-measured with a digital voltmeter during recording mode.
 5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

6. Shaded () parts are critical for safety. Replace only with specific part numbers.
 7. NPN type digital transistors are DTC144WF.
 8. PNP type digital transistors are DTA144WF.
 9. All diodes are 1SS133.



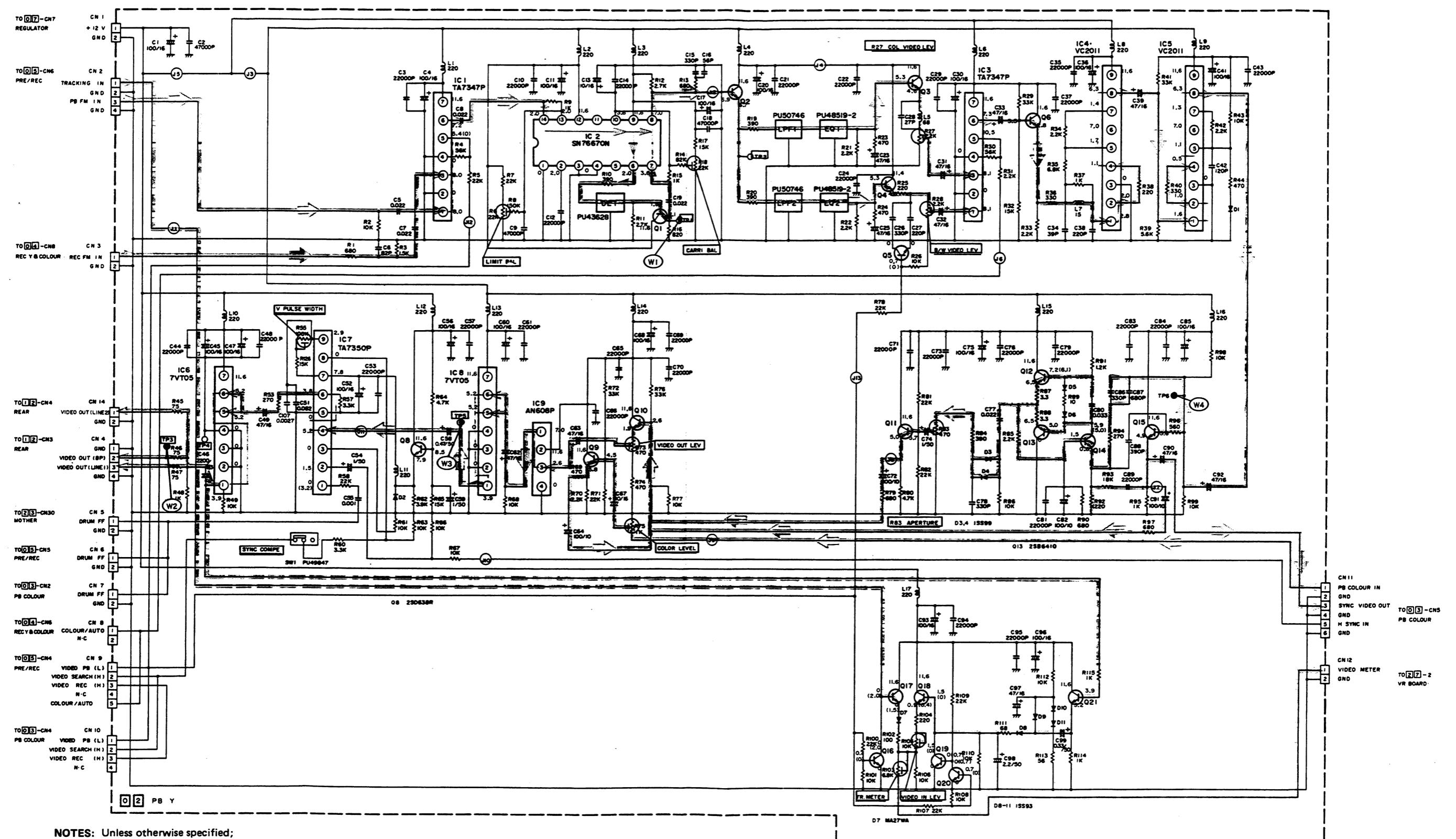
4.13 AUDIO CIRCUIT BOARD

- MAIN WAVEFORMS OF AUDIO CIRCUIT -



A B C D E F G H

4.14 VIDEO (PB Y) SCHEMATIC DIAGRAM



A

B

C

D

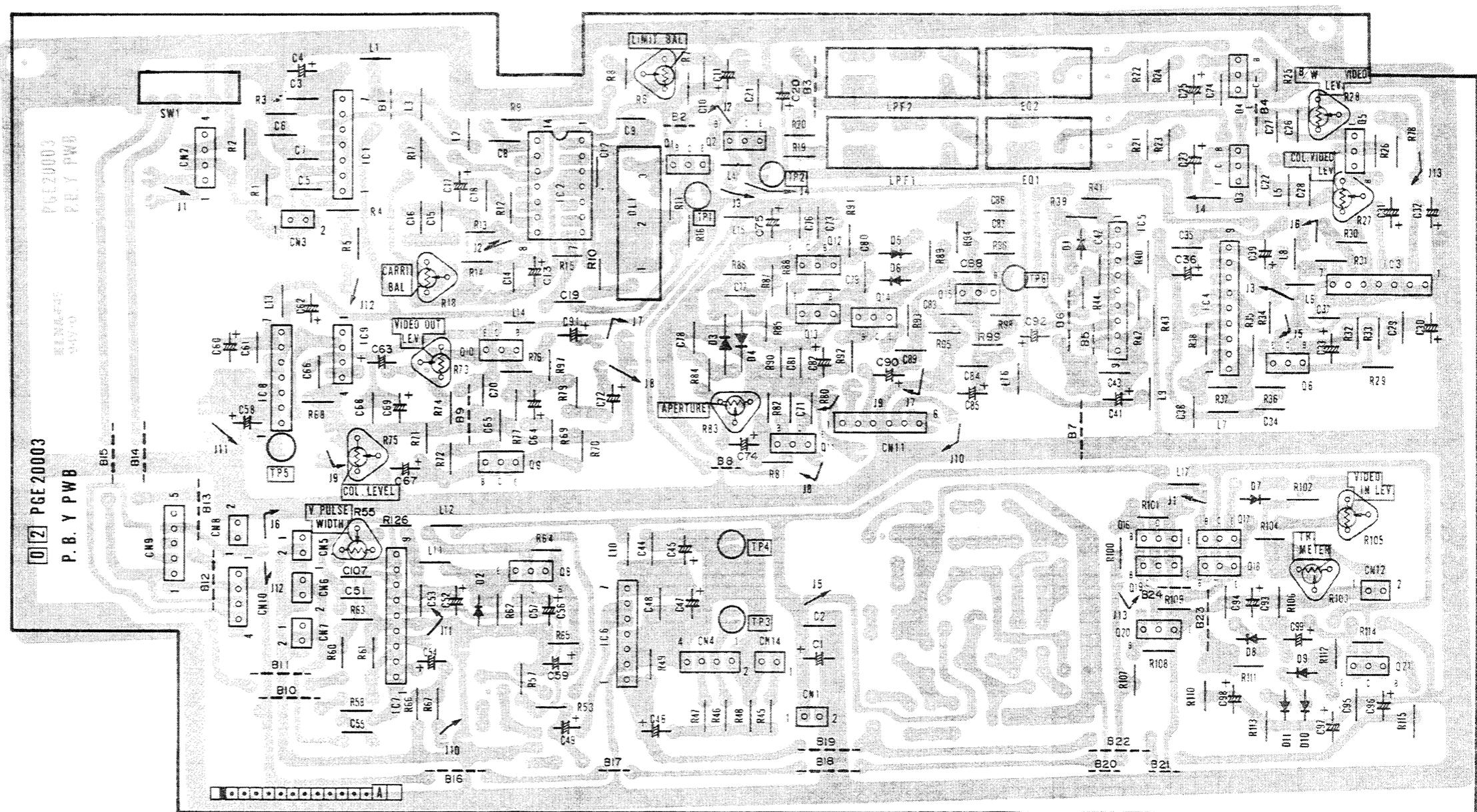
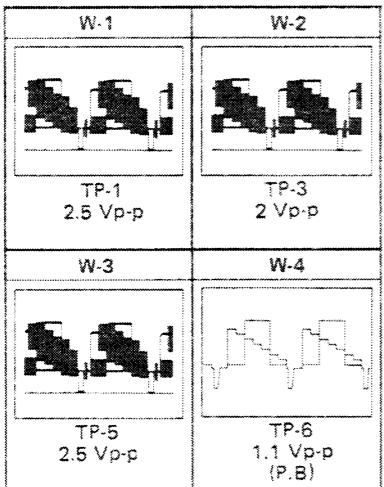
E

F

G

4.15 VIDEO (PB Y) CIRCUIT BOARD

- MAIN WAVEFORMS OF
VIDEO (PB Y) CIRCUIT -



A

B

C

D

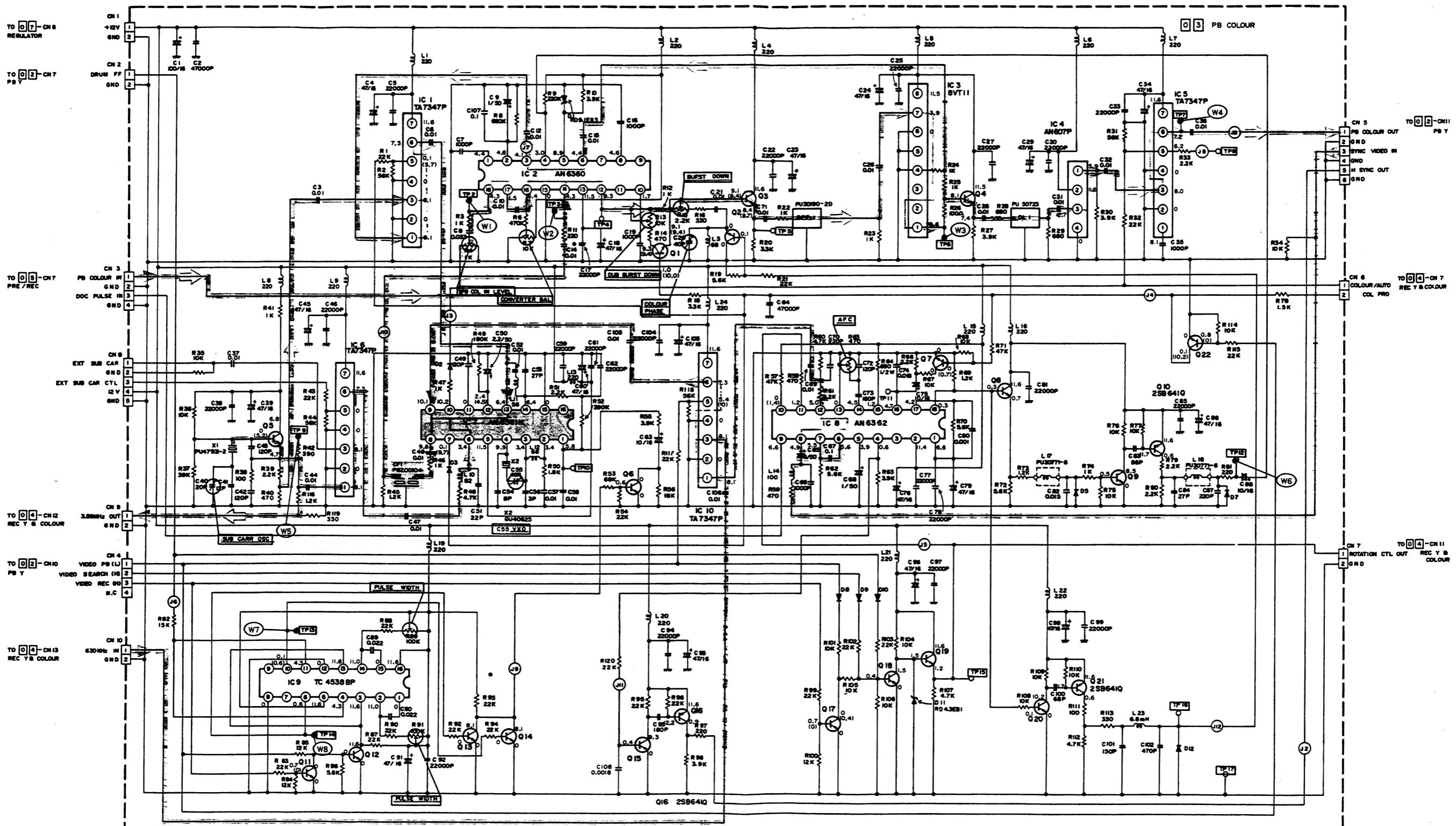
E

F

G

H

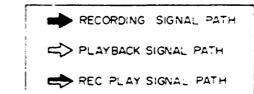
4.16 VIDEO (PB COLOR) SCHEMATIC DIAGRAM



NOTES: Unless otherwise specified;

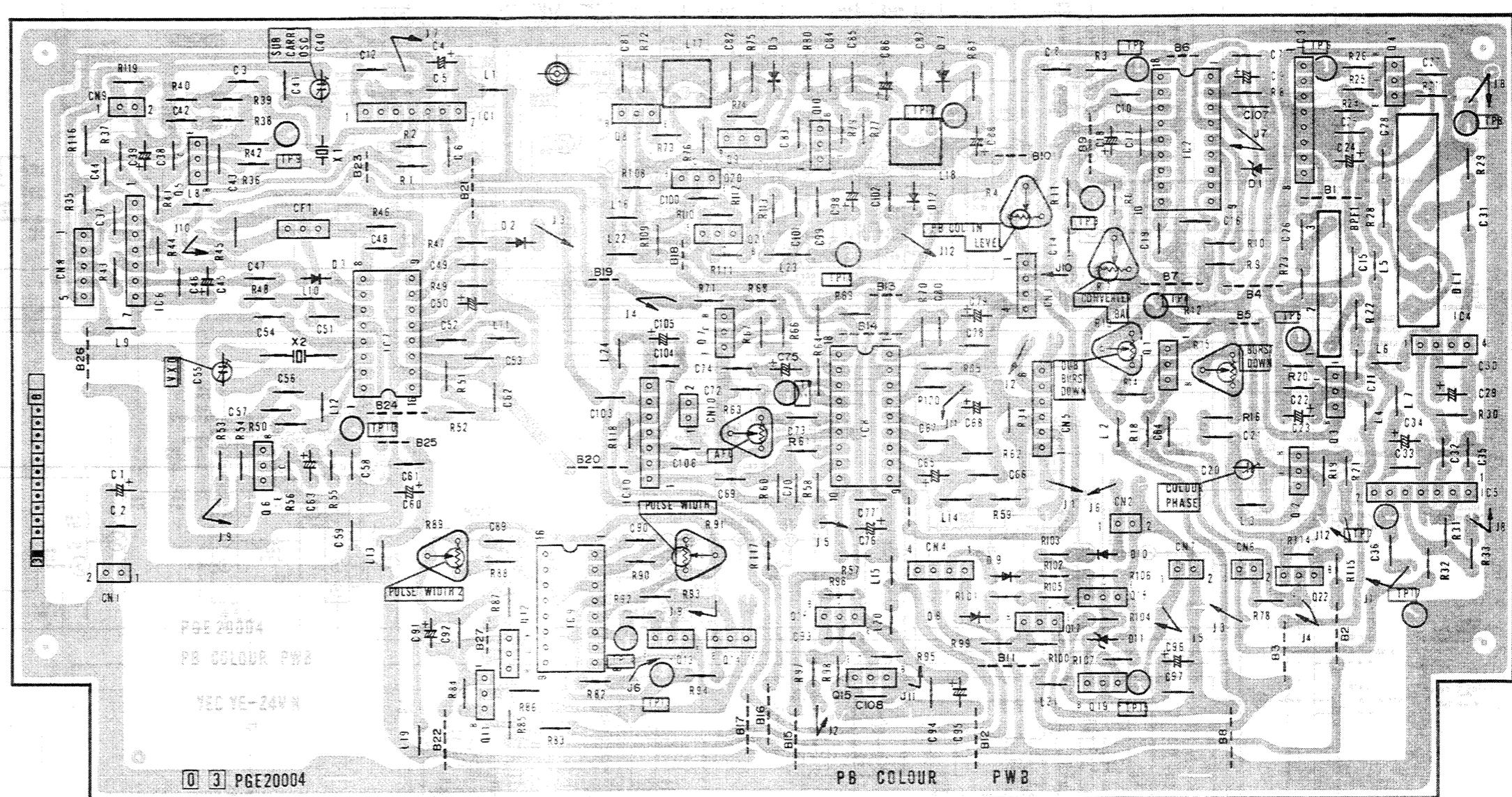
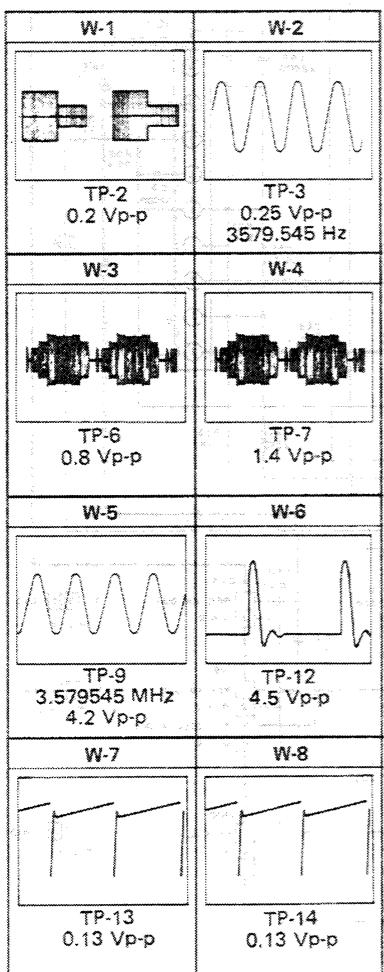
1. All resistance values are in ohms. (1/6W).
2. All inductance values are in μ H.
3. All capacitance values are in μ F.
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

6. Shaded () parts are critical for safety. Replace only with specified part numbers.
7. All diodes are 1SS133.
8. NPN type transistors are 2SC2647C.



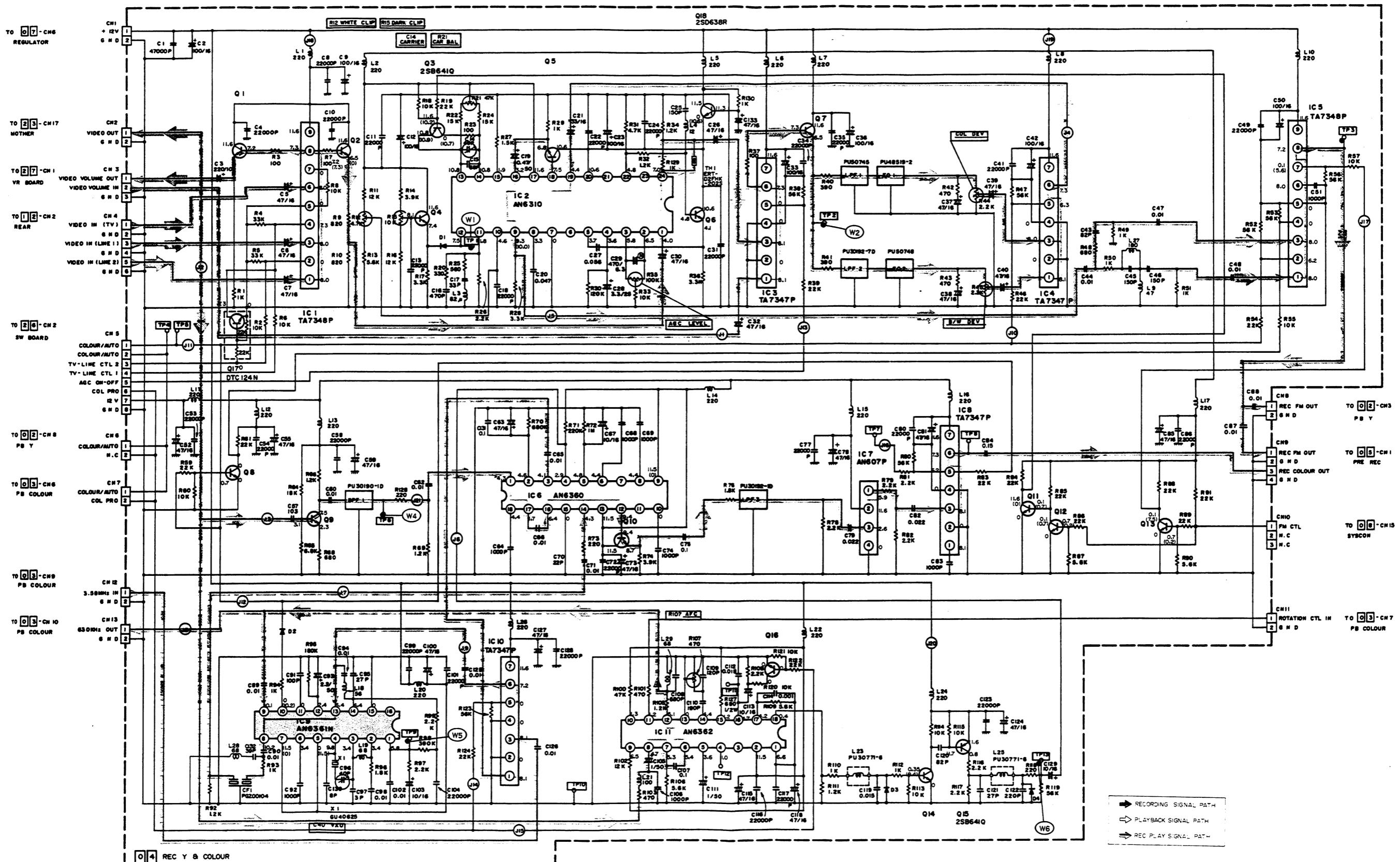
4.17 VIDEO (PB COLOR) CIRCUIT BOARD

— MAIN WAVEFORMS OF VIDEO
(PB COLOR) CIRCUIT —



A B C D E F G H

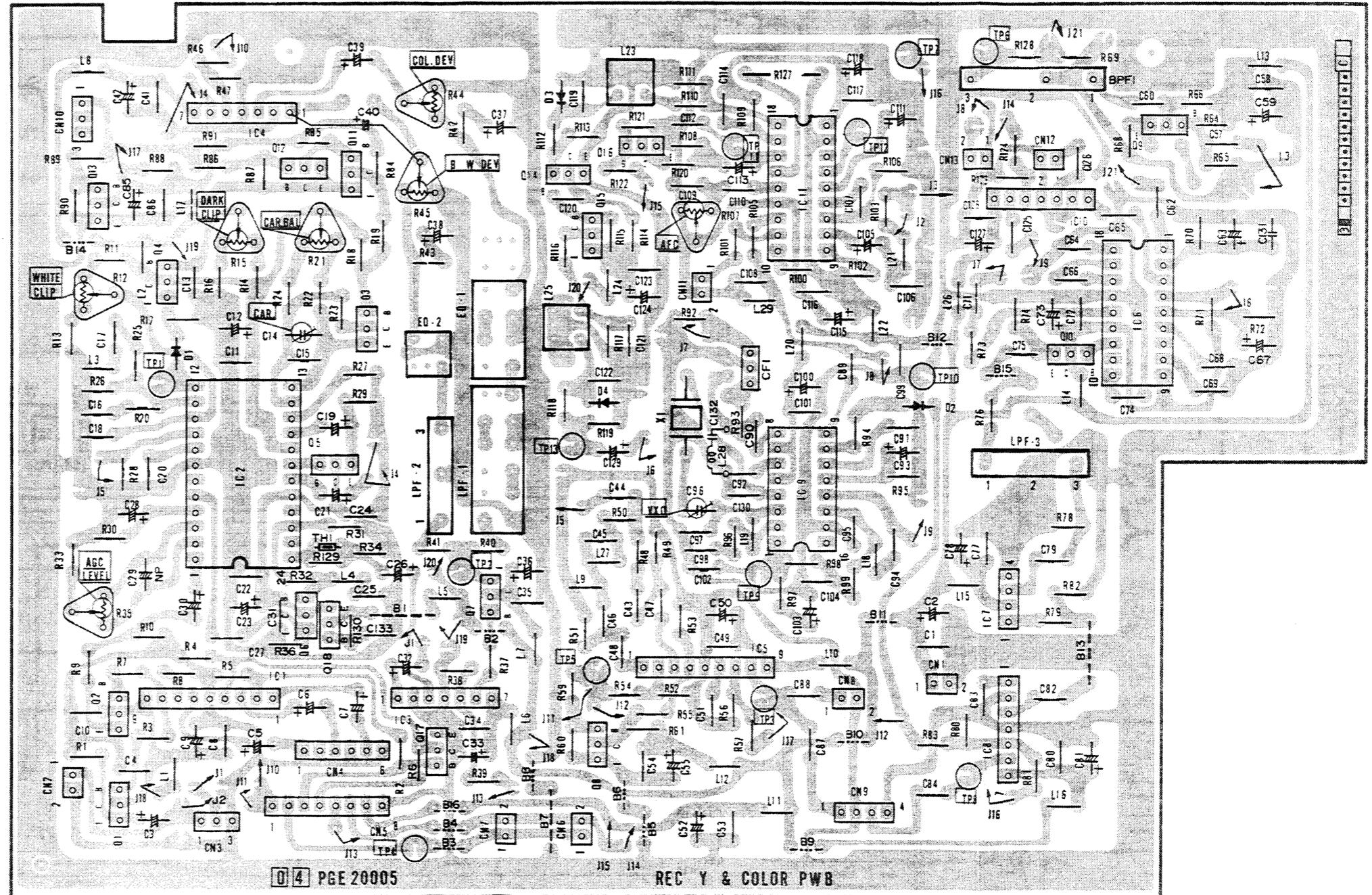
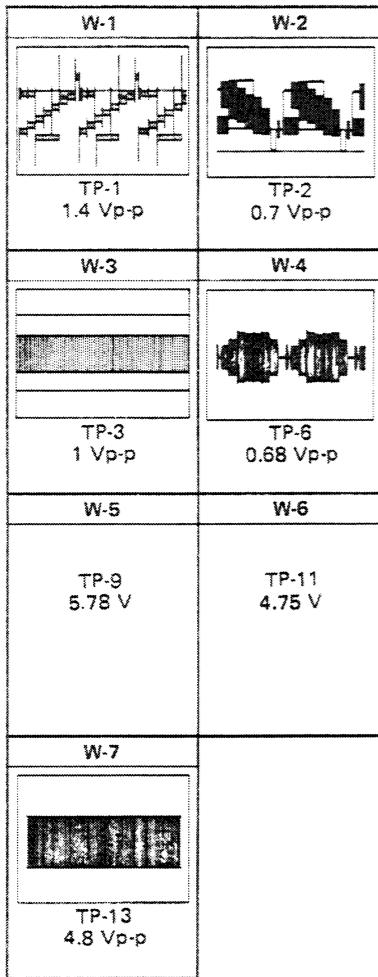
4.18 VIDEO (REC Y & COLOR) SCHEMATIC DIAGRAM



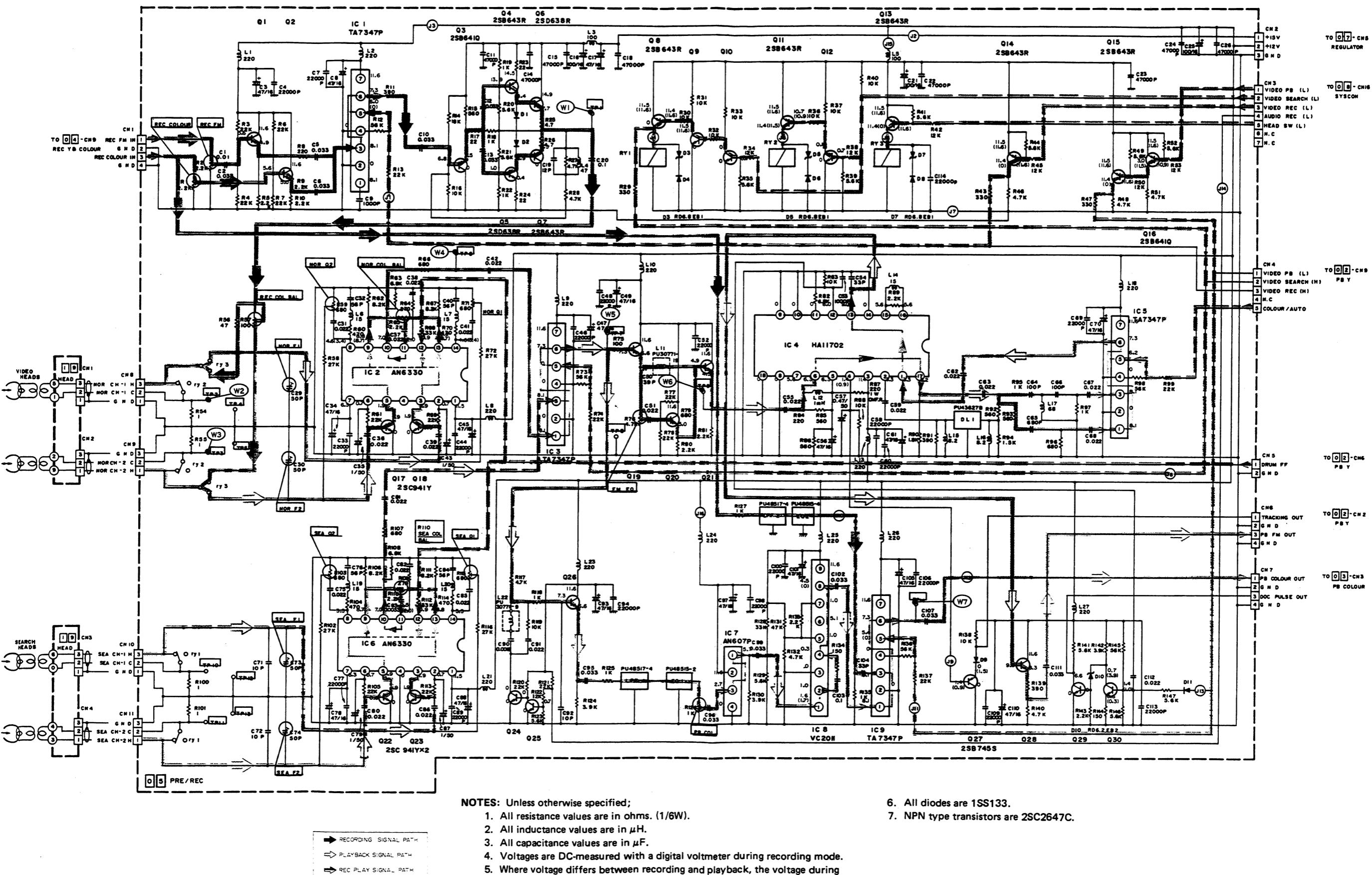
A | B | C | D | E | F | G | H

4.19 VIDEO (REC Y & COLOR) CIRCUIT BOARD

— MAIN WAVEFORMS OF VIDEO
(REC Y & COLOR) CIRCUIT —



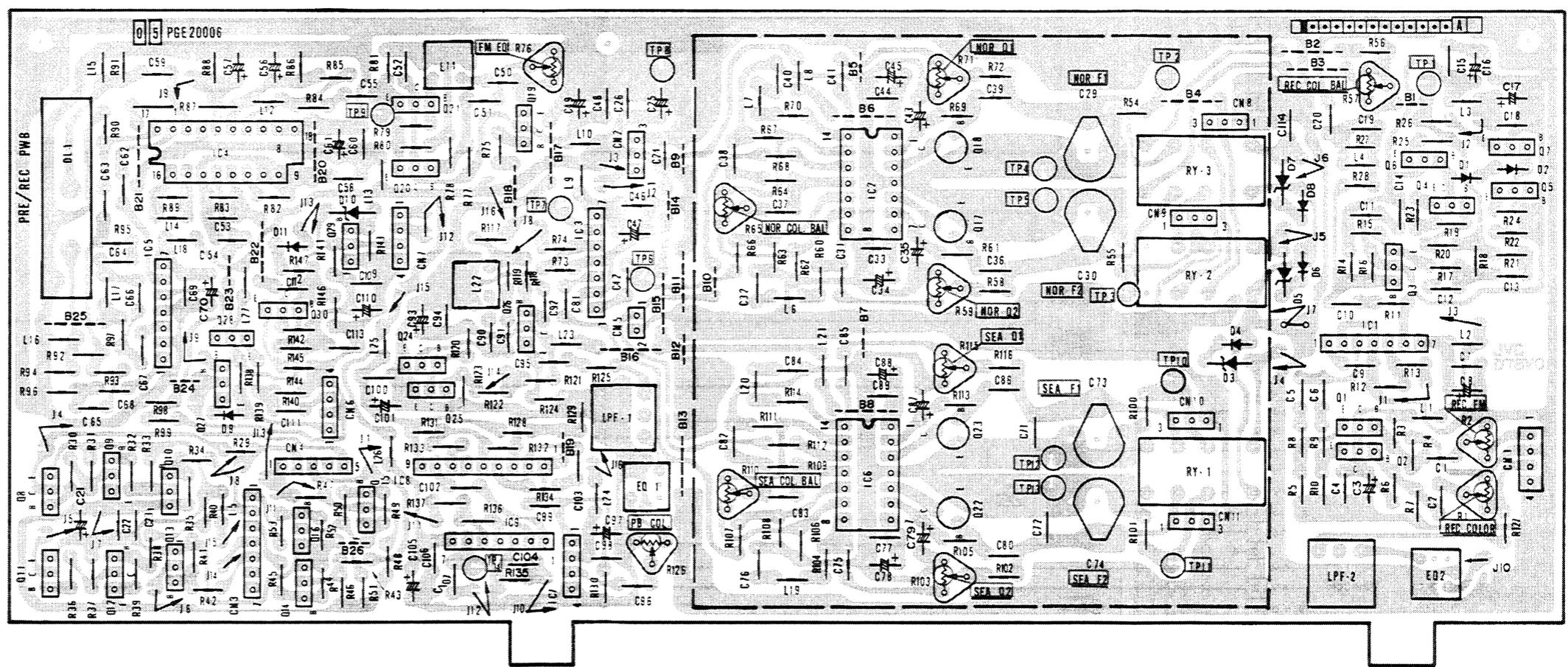
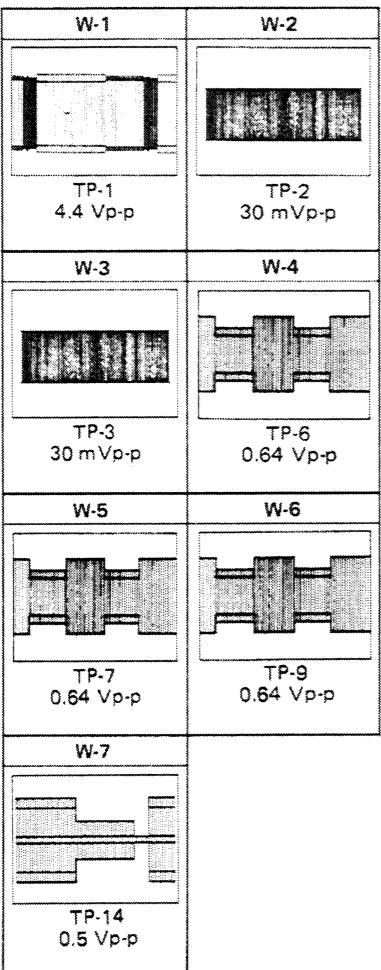
4.20 VIDEO (PRE/REC) SCHEMATIC DIAGRAM



A | B | C | D | E | F | G | H

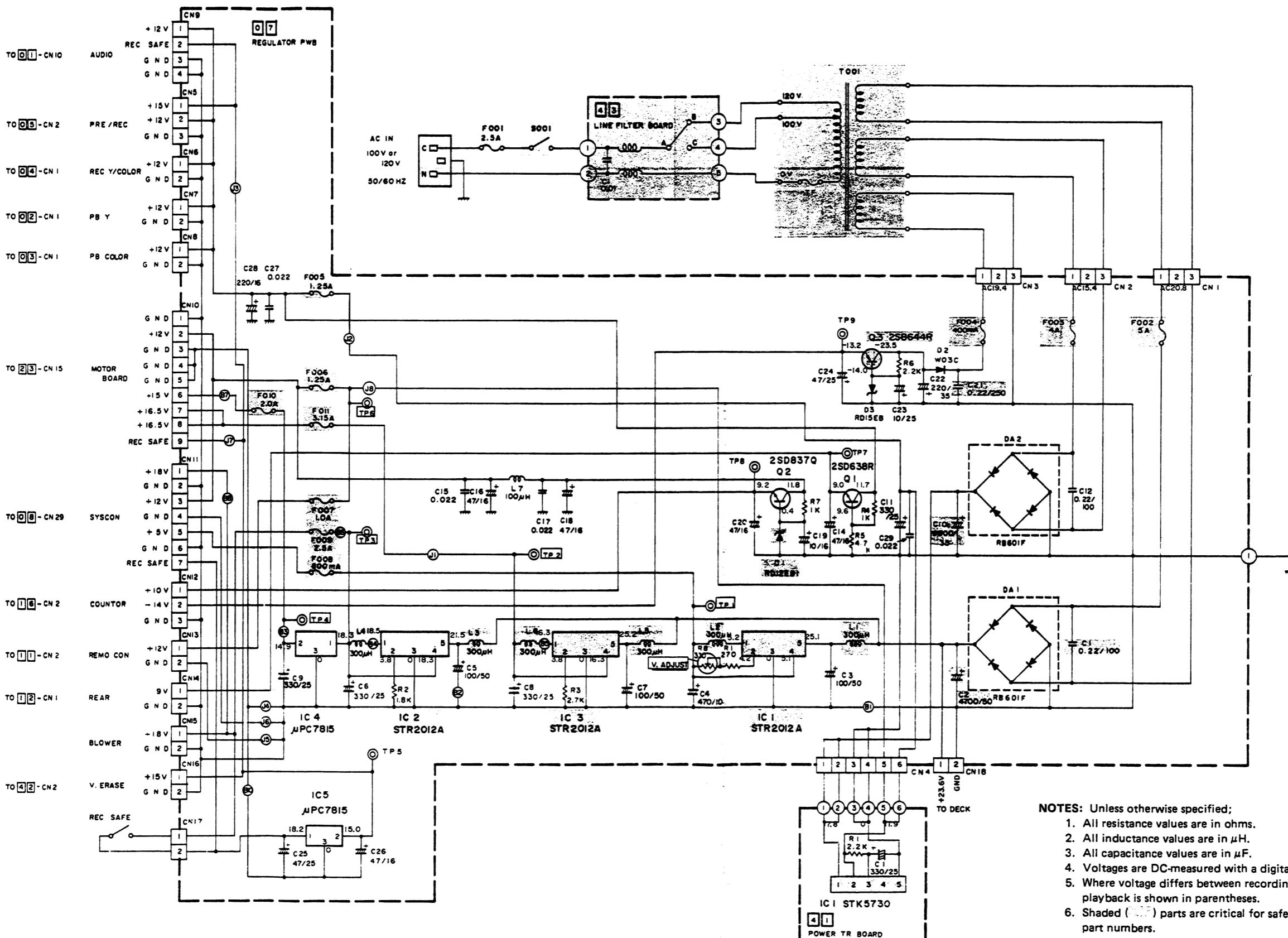
4.21 VIDEO (PRE/REC) CIRCUIT BOARD

— MAIN WAVEFORMS OF
VIDEO (PRE/REC) CIRCUIT —



A B C D E F G H

4.22 REGULATOR, POWER TRANSISTOR AND LINE FILTER SCHEMATIC DIAGRAMS



NOTES: Unless otherwise specified;

1. All resistance values are in ohms.
2. All inductance values are in μH .
3. All capacitance values are in μF .
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
6. Shaded (■) parts are critical for safety. Replace only with specified part numbers.

A

B

C

D

1

4.23 REGULATOR, POWER TRANSISTOR AND LINE FILTER CIRCUIT BOARDS

2

- REGULATOR -

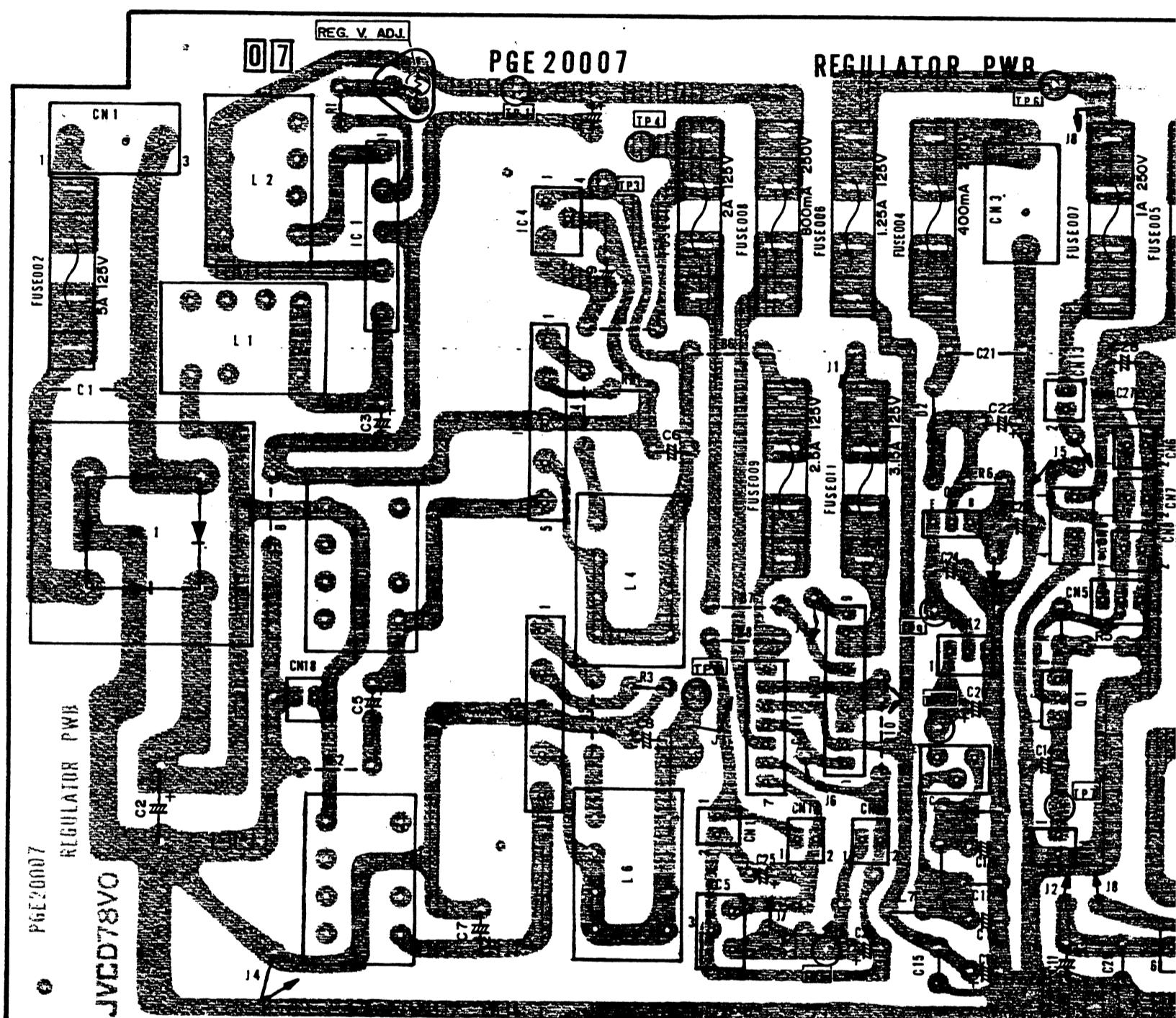
3

4

5

6

7



E

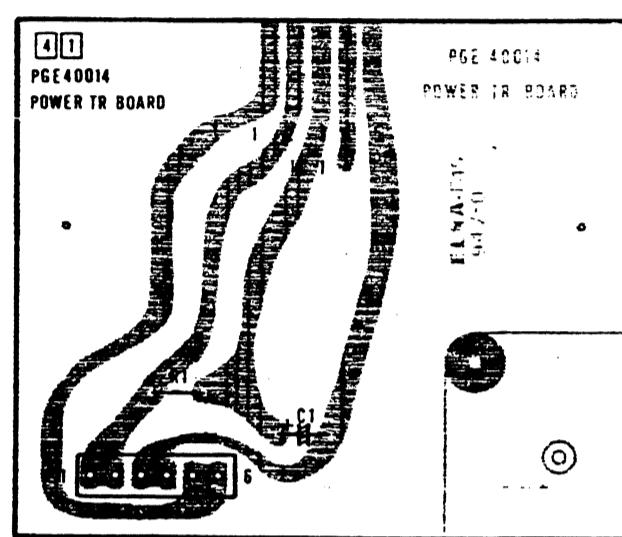
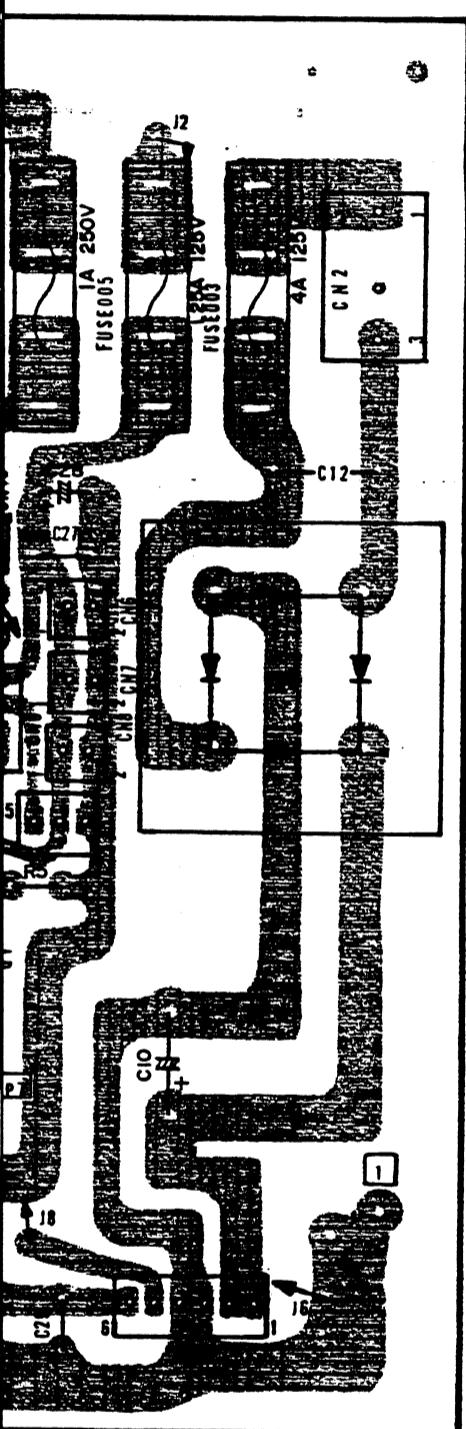
F

G

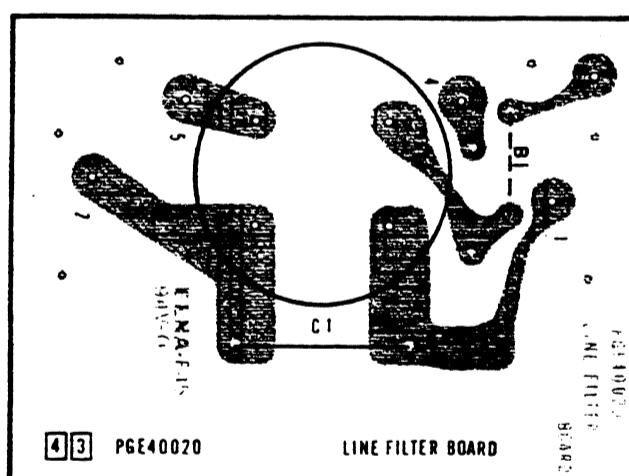
H

I

- POWER TRANSISTOR -

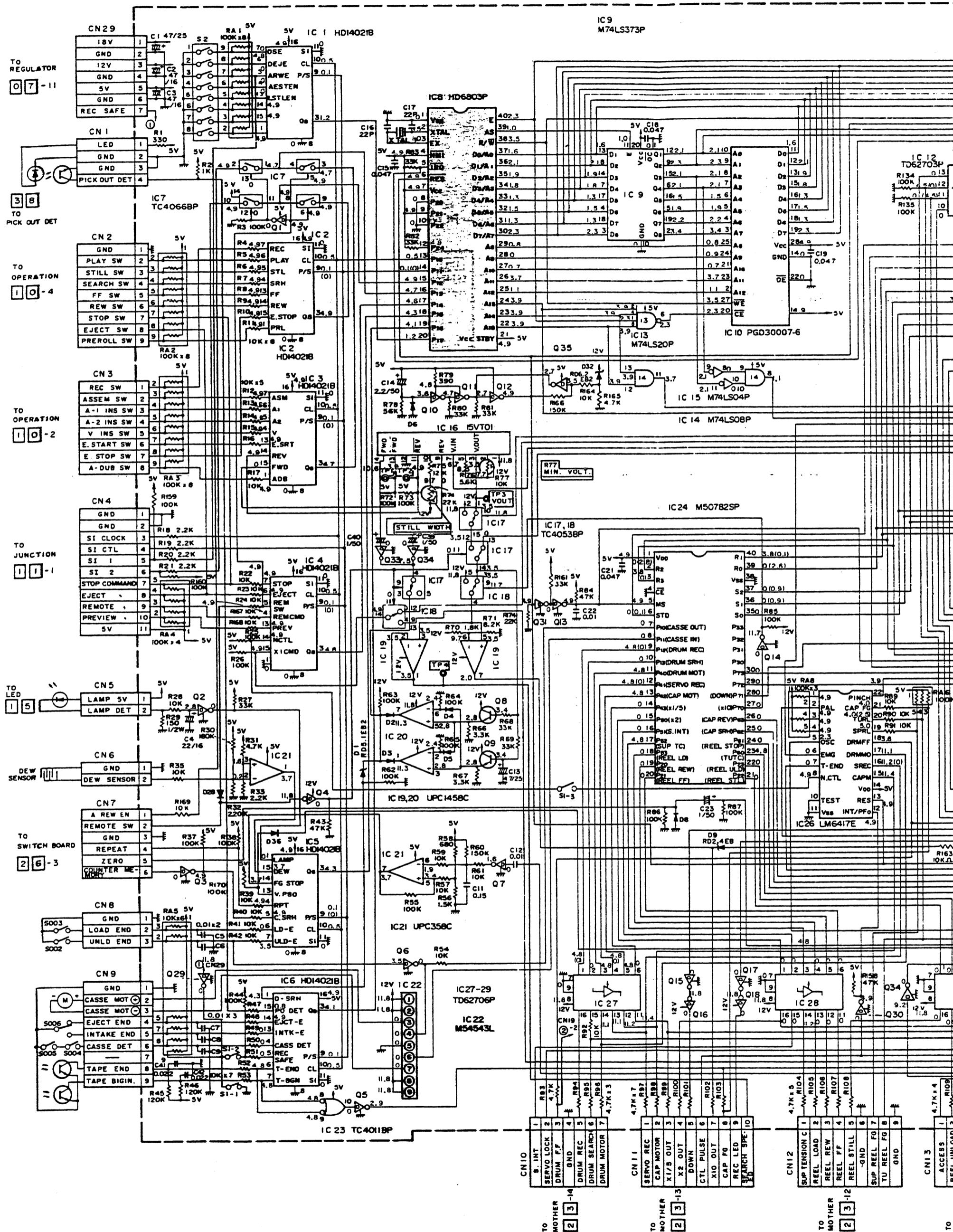


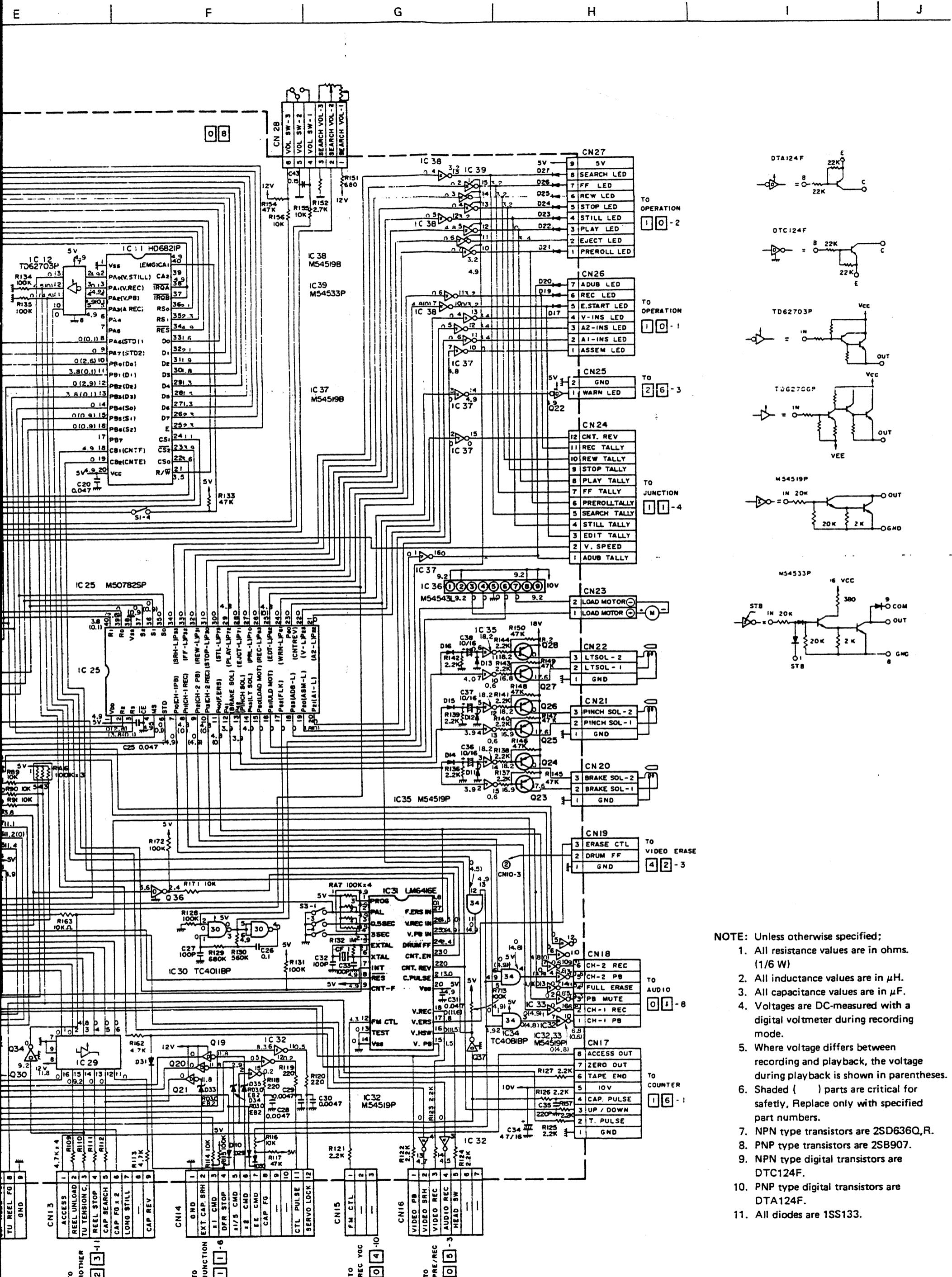
- LINE FILTER -



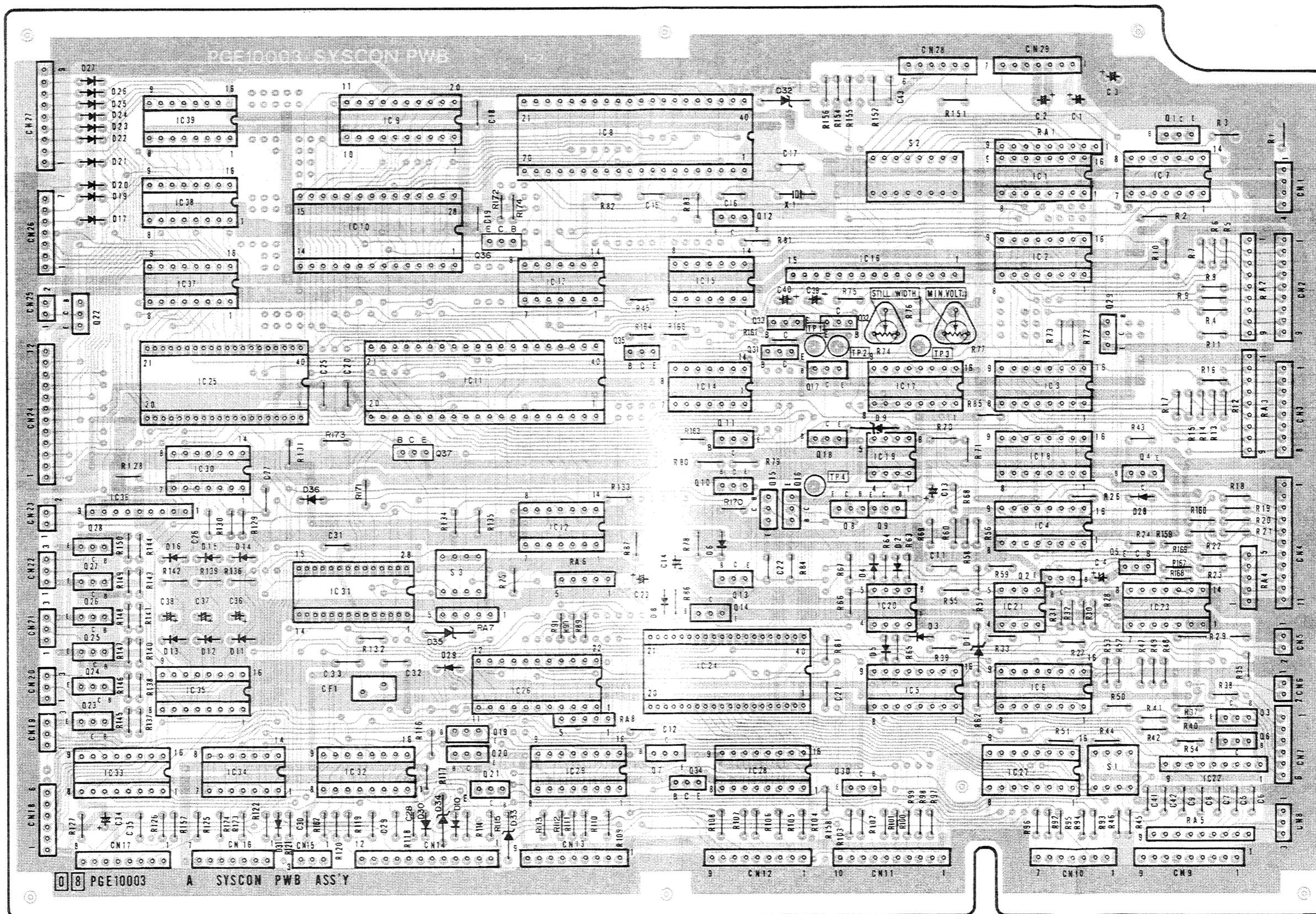
A B C D E

4.24 SYSTEM CONTROL SCHEMATIC DIAGRAM





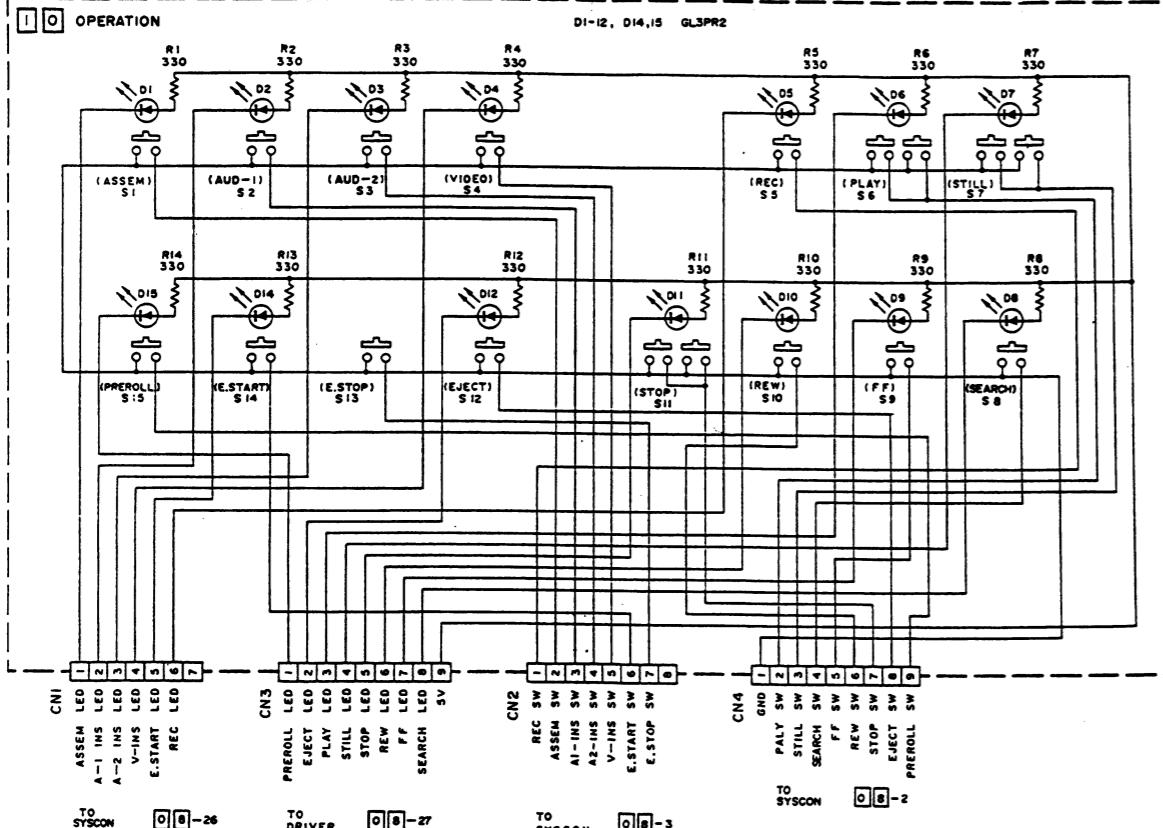
4.25 SYSTEM CONTROL CIRCUIT BOARD



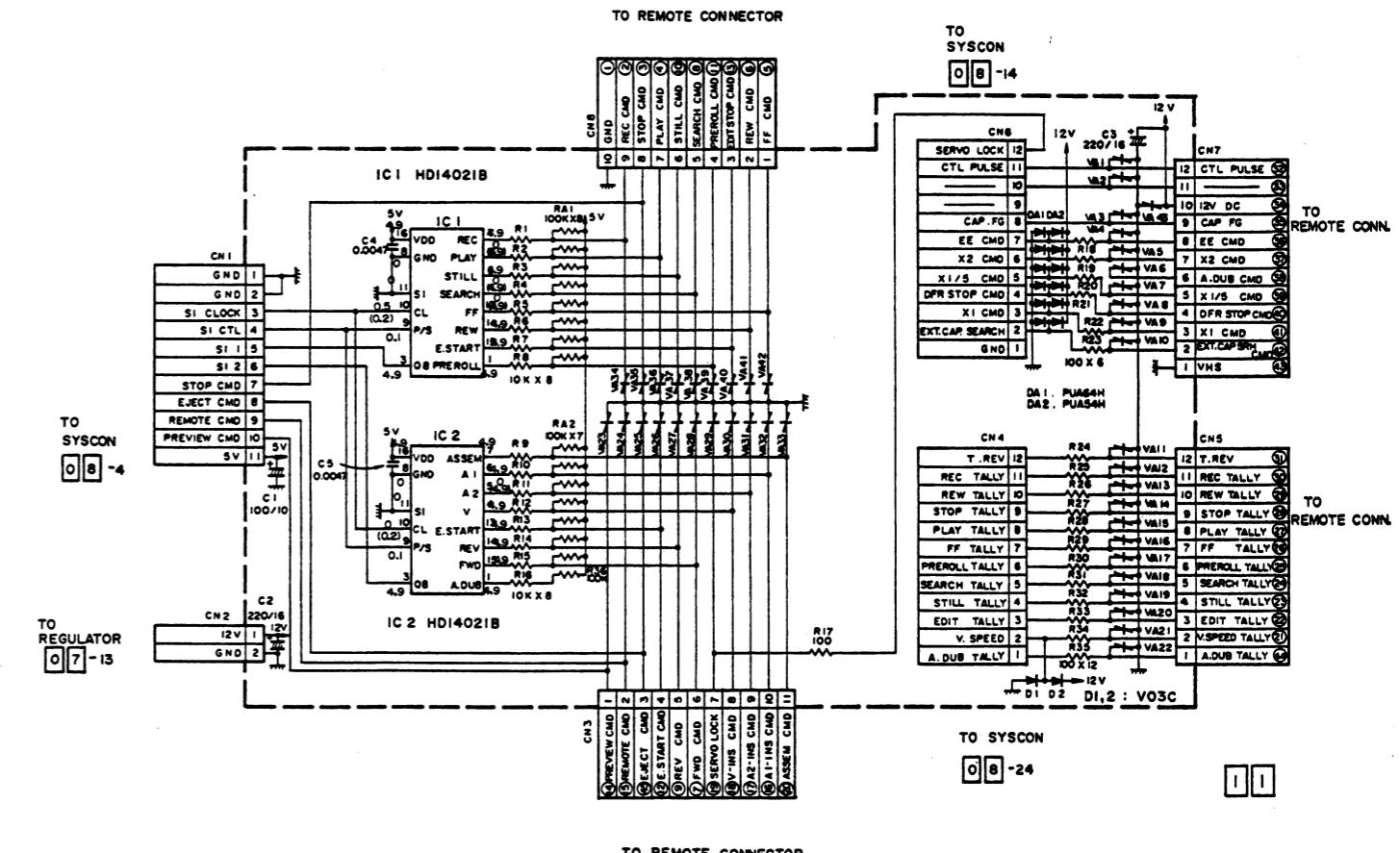
SYS-CON BOARD
(OPE. & JUNCTION SCHEMATIC) 4-25

**4-25 SYS-CON BOARD
(OPE. & JUNCTION SCHEMATIC)**

4.26 OPERATION SCHEMATIC DIAGRAM



4.27 JUNCTION SCHEMATIC DIAGRAM

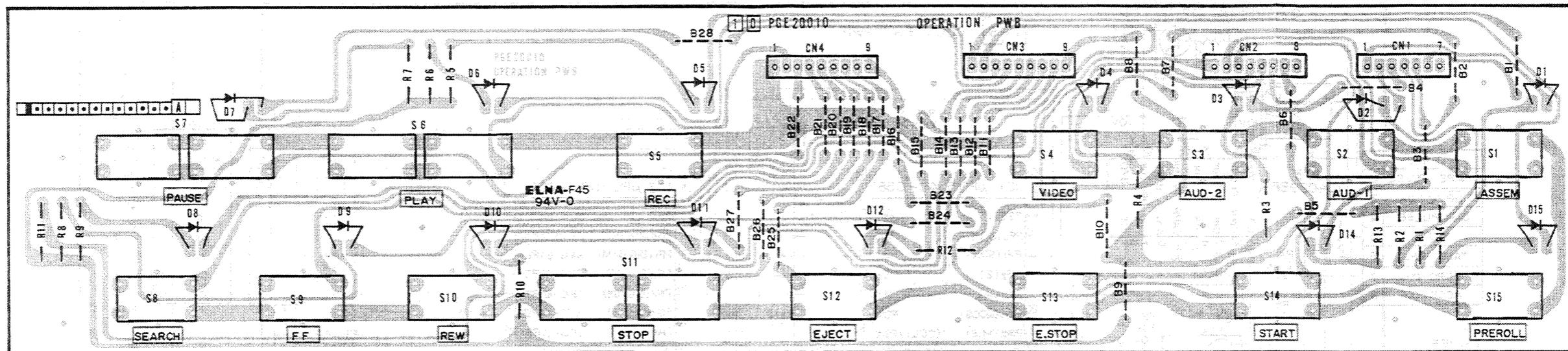


NOTES: Unless otherwise specified

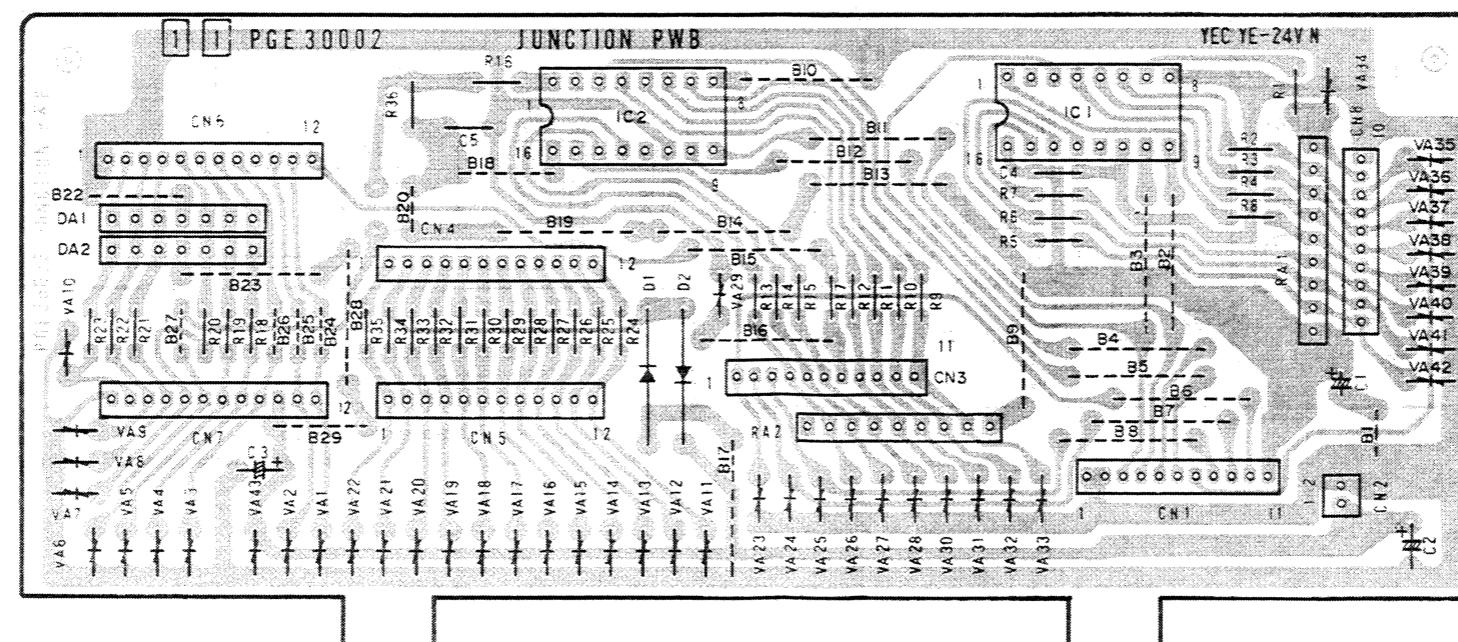
1. All resistance values are in ohms. (1/6 W).
 2. All inductance values are in μ H.
 3. All capacitance values are in μ F.
 4. Voltages are DC-measured with a digital voltmeter during recording mode.
 5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
 6. All varistors are PU49624-2.

A B C D E F G H

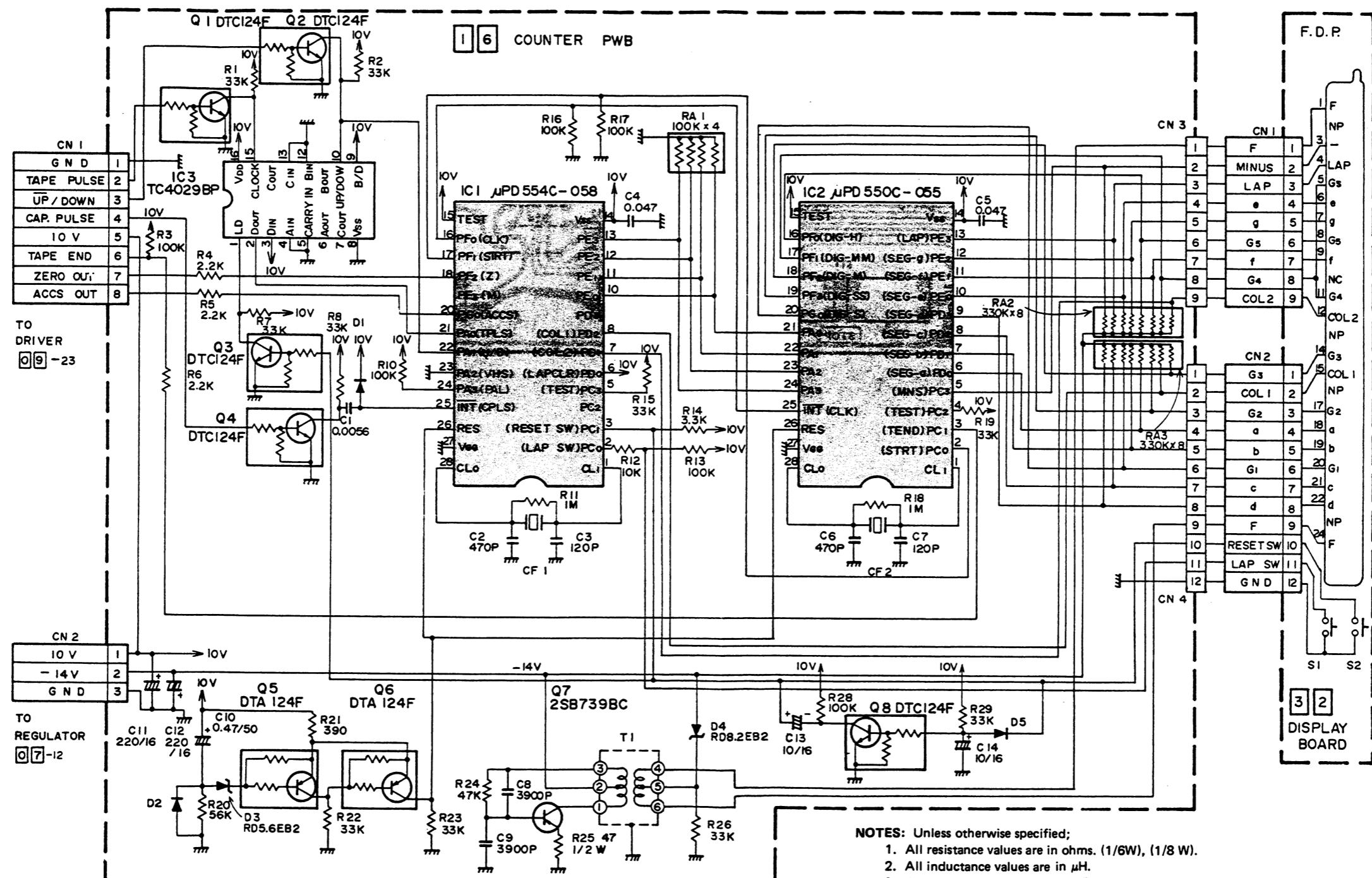
4.28 OPERATION CIRCUIT BOARD



4.29 JUNCTION CIRCUIT BOARD



4.30 COUNTER & DISPLAY SCHEMATIC DIAGRAMS



NOTES: Unless otherwise specified:

1. All resistance values are in ohms. (1/6W), (1/8 W).
 2. All inductance values are in μ H.
 3. All capacitance values are in μ F.
 4. All diodes are 1SS133.
 5. Shaded (■) parts are critical for safety. Replace only with specified part numbers.

4.31 COUNTER & DISPLAY CIRUCIT BOARDS

• [View Details](#) [Edit](#) [Delete](#)

1

1

5

6

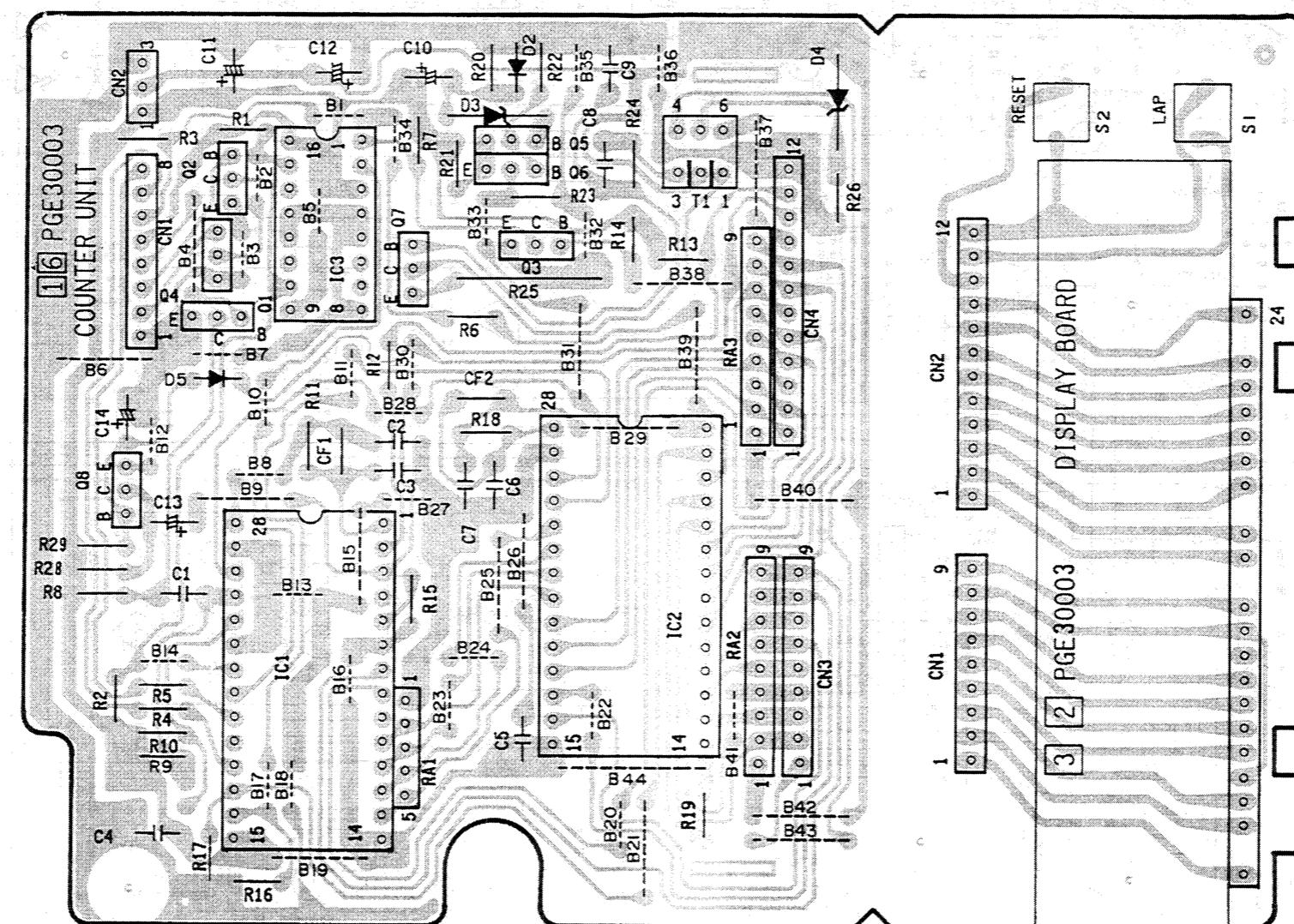
1

□

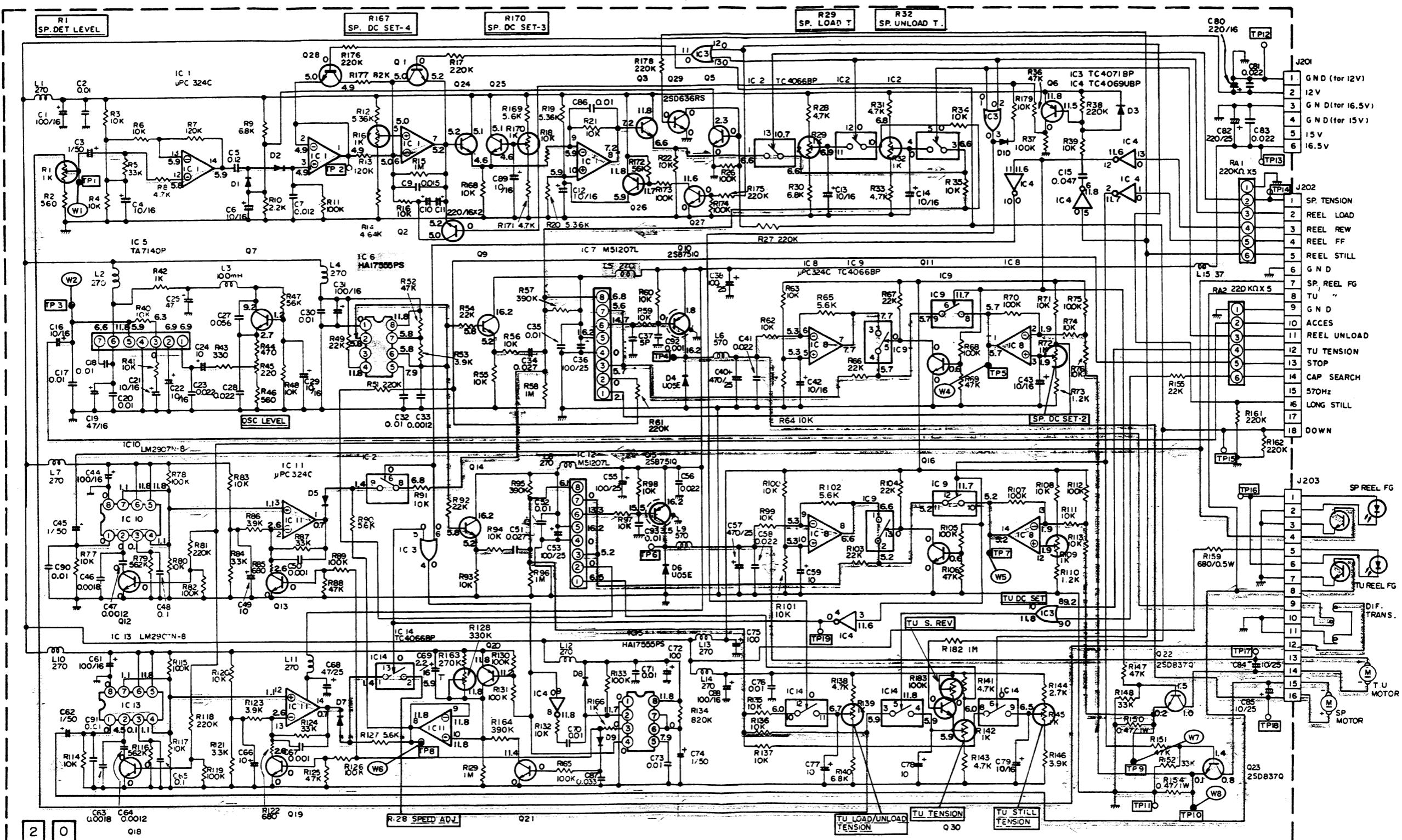
三

11

6



4.32 REEL SERVO SCHEMATIC DIAGRAM



NOTES: Unless otherwise specified:

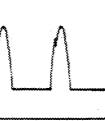
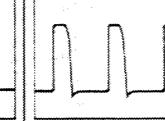
1. All resistance values are in ohms. (1/6W), (1/8 W).
2. All inductance values are in μ H.
3. All capacitance values are in μ F. (16 V)
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

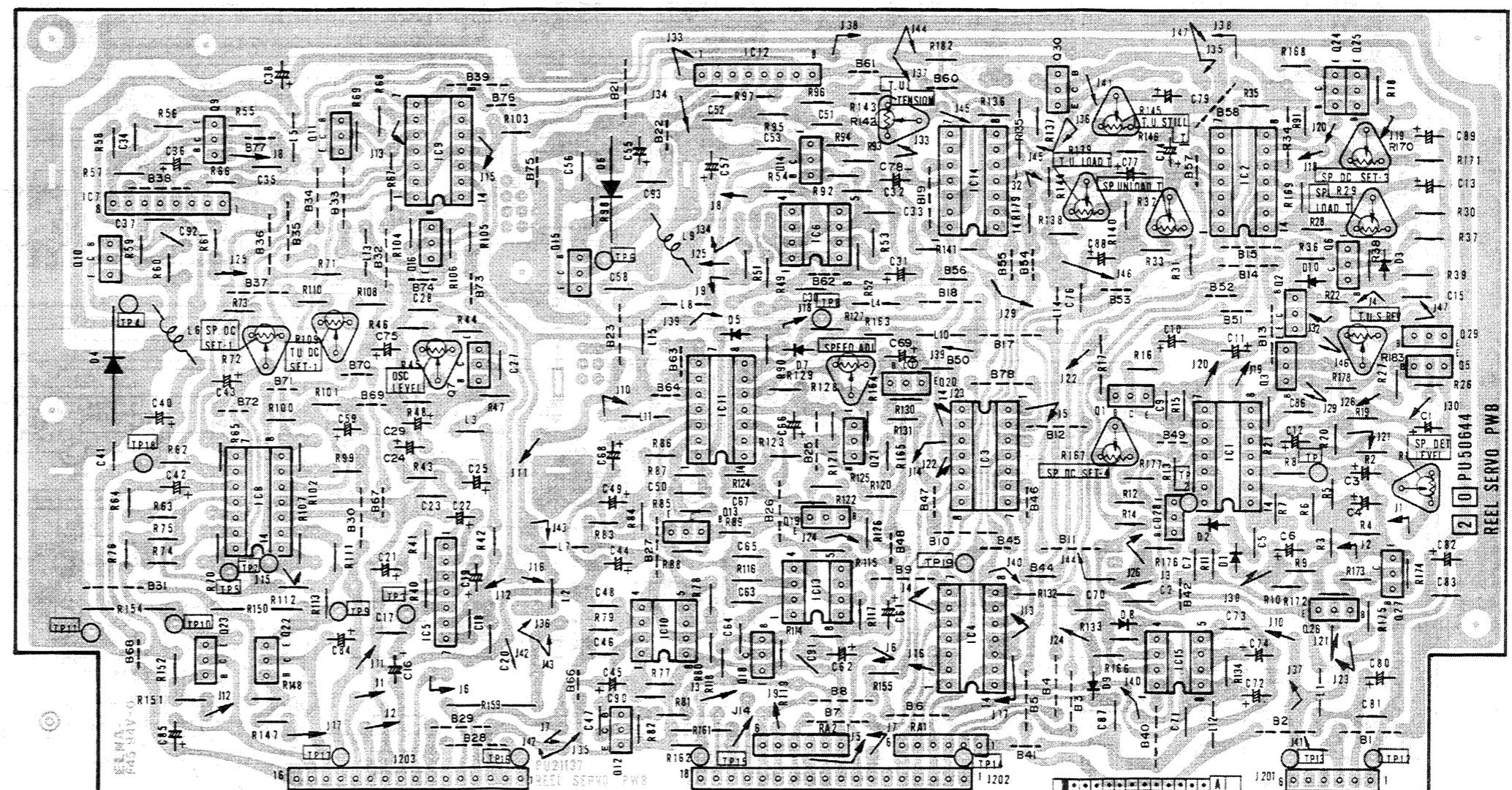
6. Shaded (■) parts are critical for safety. Replace only with specified part numbers.

7. NPN type transistors are 2SD636RS.
8. PNP type transistors are 2SB641RS.
9. All diodes are 1SS133.

4.33 REEL SERVO CIRCUIT BOARD

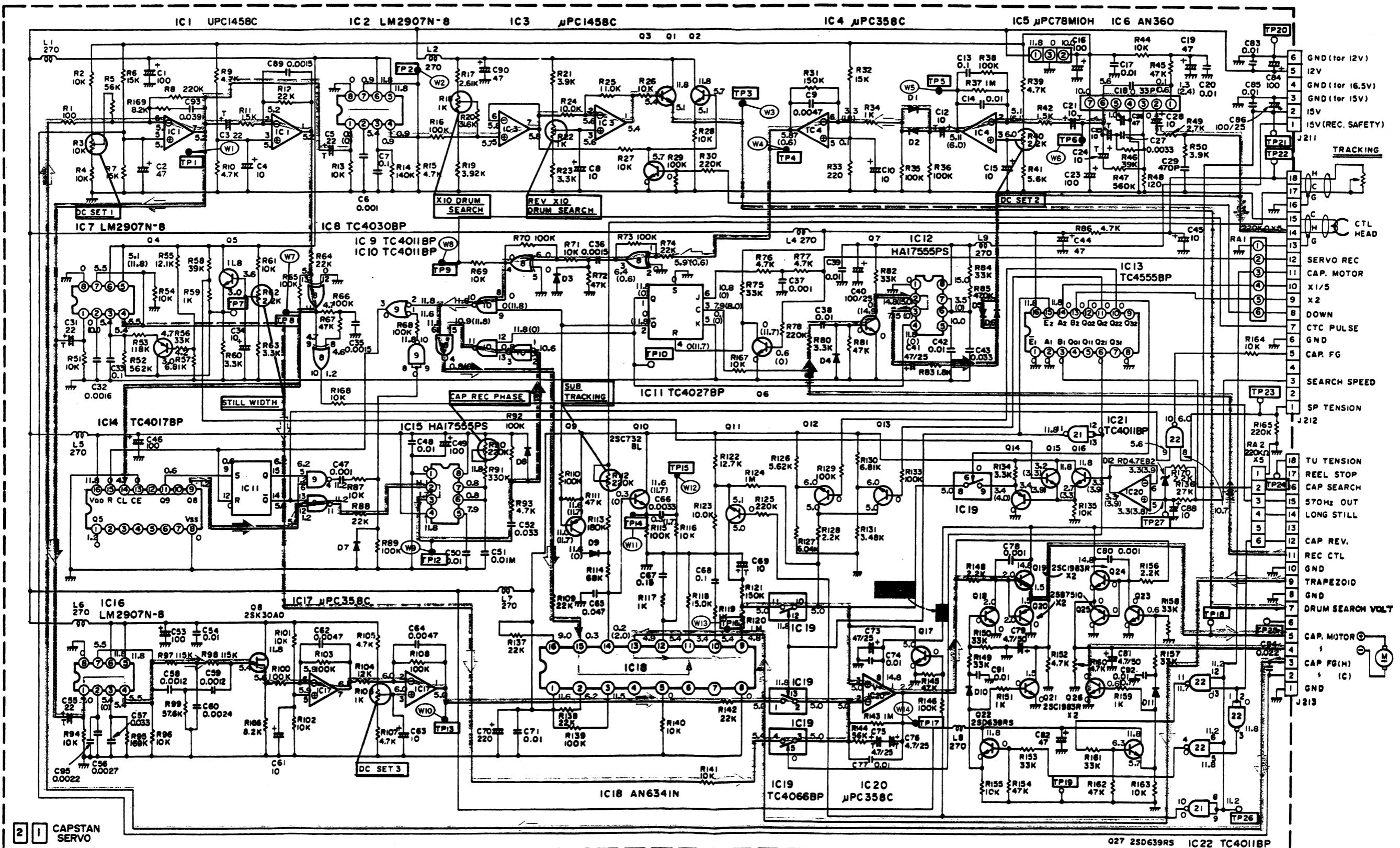
– MAIN WAVEFORMS OF REEL SERVO CIRCUIT –

W-1	W-2
	
TP-1 0.3 Vp-p	TP-3 2.9 Vp-p
W-3	W-4
	
TP-4 17 Vp-p	TP-6 17 Vp-p
W-5	W-6
TP-5 5.8 V DC	TP-7 5.2 V DC
W-7	W-8
TP-8 12 V DC	TP-9 0.2 V DC (REC/PLAY) 0.1 V DC (STILL)
W-9	
TP-10 70 mV (REC/PLAY) 0.17 V (STILL)	



A | B | C | D | E | F | G | H

4.34 CAPSTAN SERVO SCHEMATIC DIAGRAM



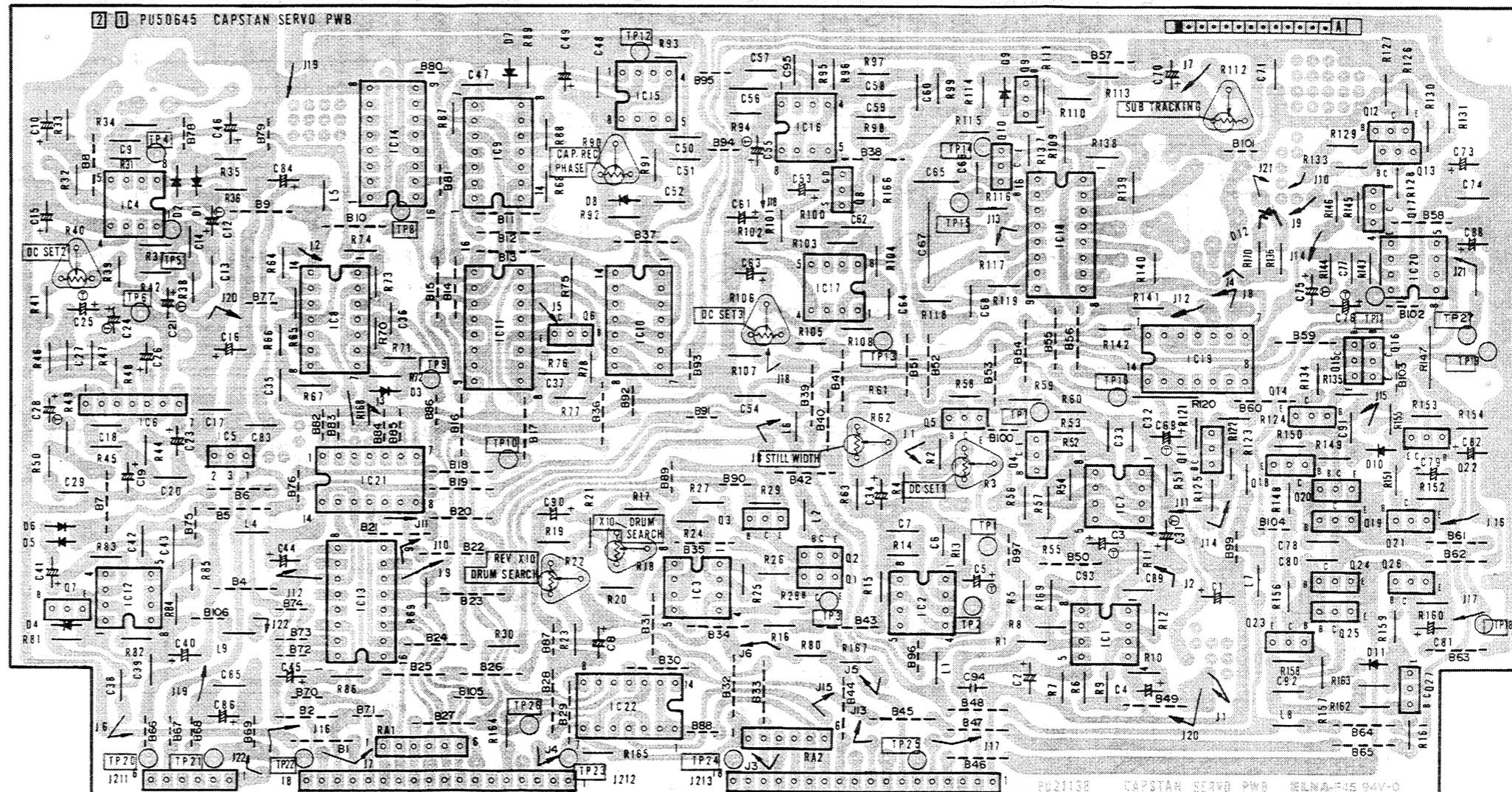
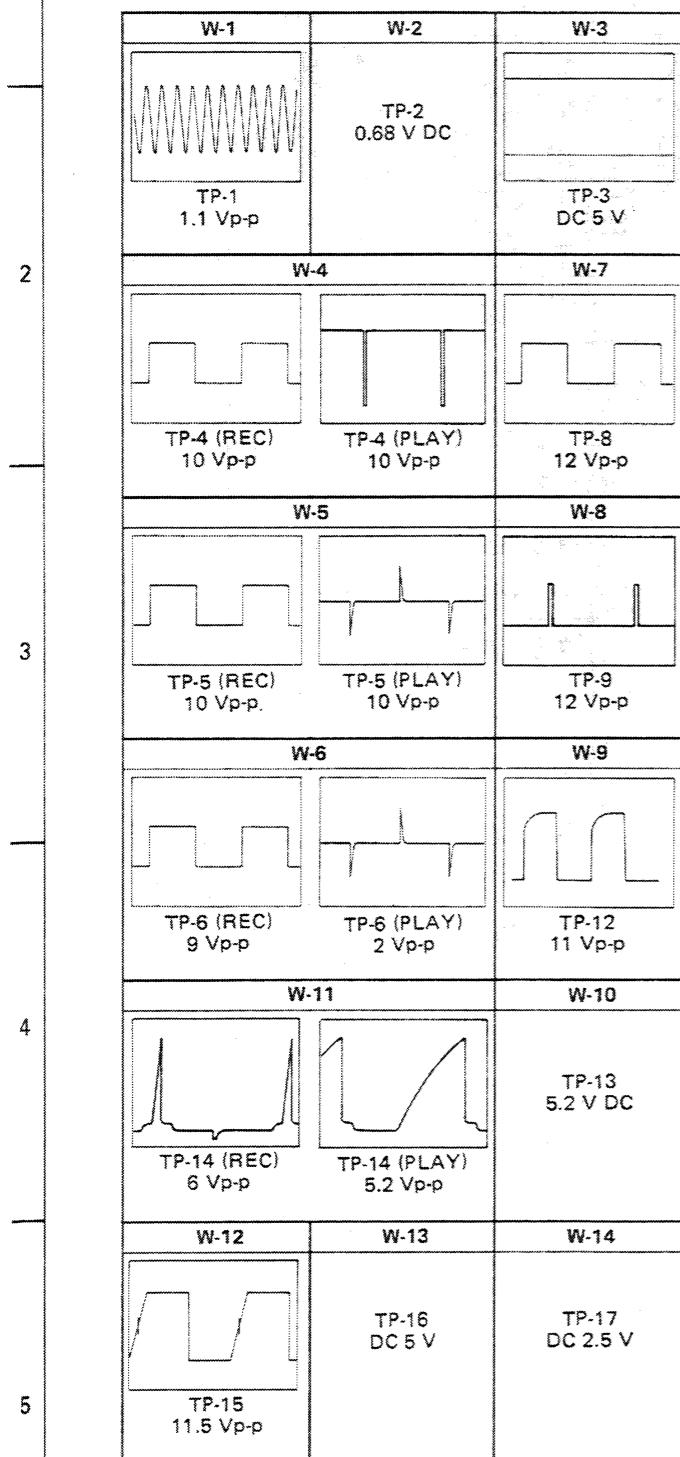
NOTES: Unless otherwise specified;

- All resistance values are in ohms. (1/6W), (1/8 W).
- All inductance values are in μ H.
- All capacitance values are in μ F. (16 V)
- Voltages are DC-measured with a digital voltmeter during recording mode.
- Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.
- Shaded (■) parts are critical for safety. Replace only with specified part numbers.
- NPN type transistors are 2SD636RS.
- PNP type transistors are 2SB641RS.
- All diodes are 1SS133.

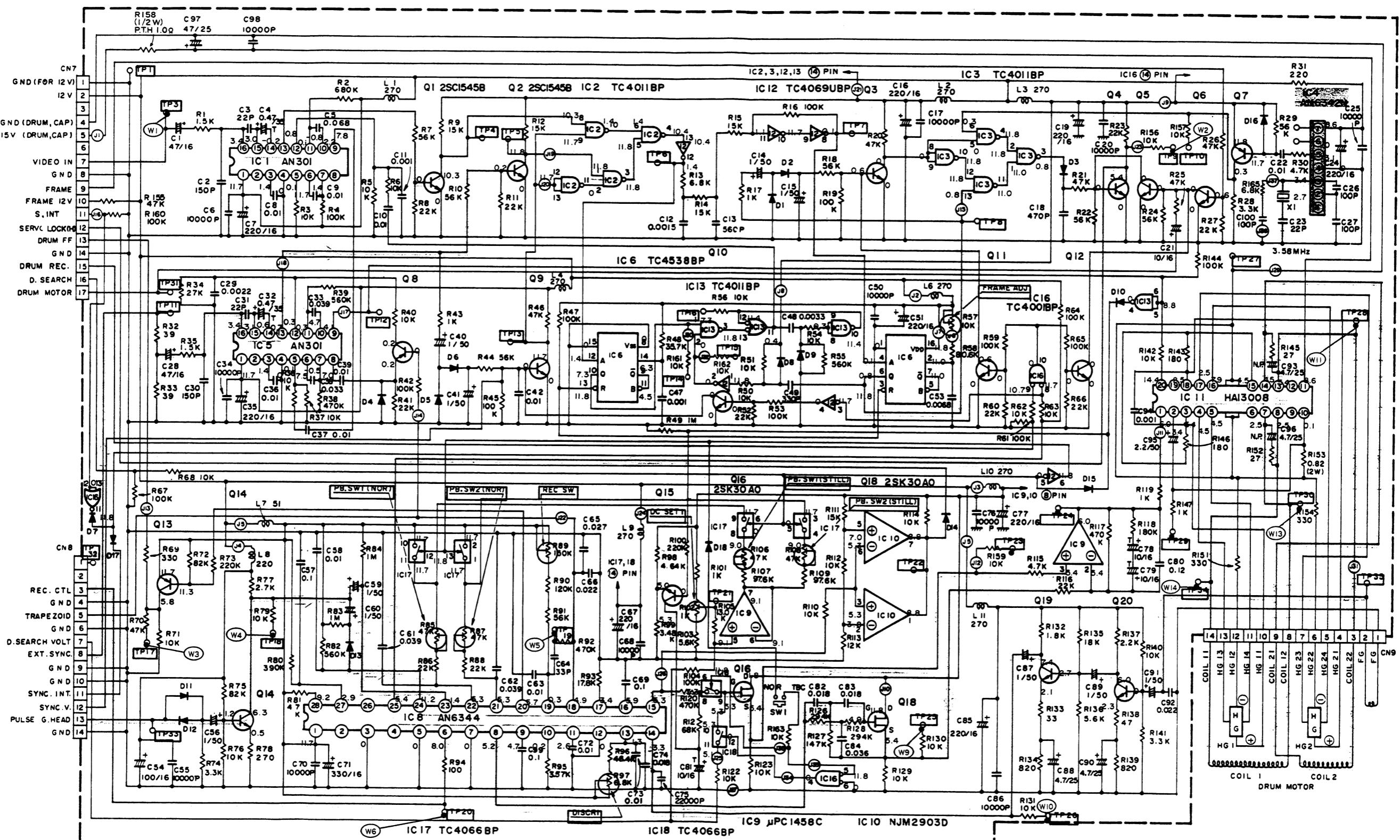
⇒ RECORDING DIGITAL PATH
⇒ PLAY BACK & ANAL. PATH
⇒ REC PLAY SIGNAL PATH

4.35 CAPSTAN SERVO CIRCUIT BOARD

- MAIN WAVEFORMS OF CAPSTAN SERVO CIRCUIT -



4.36 DRUM SERVO SCHEMATIC DIAGRAM



NOTES: Unless otherwise specified;

1. All resistance values are in ohms. (1/6W).
2. All inductance values are in μ H.
3. All capacitance values are in μ F. (16 V)
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

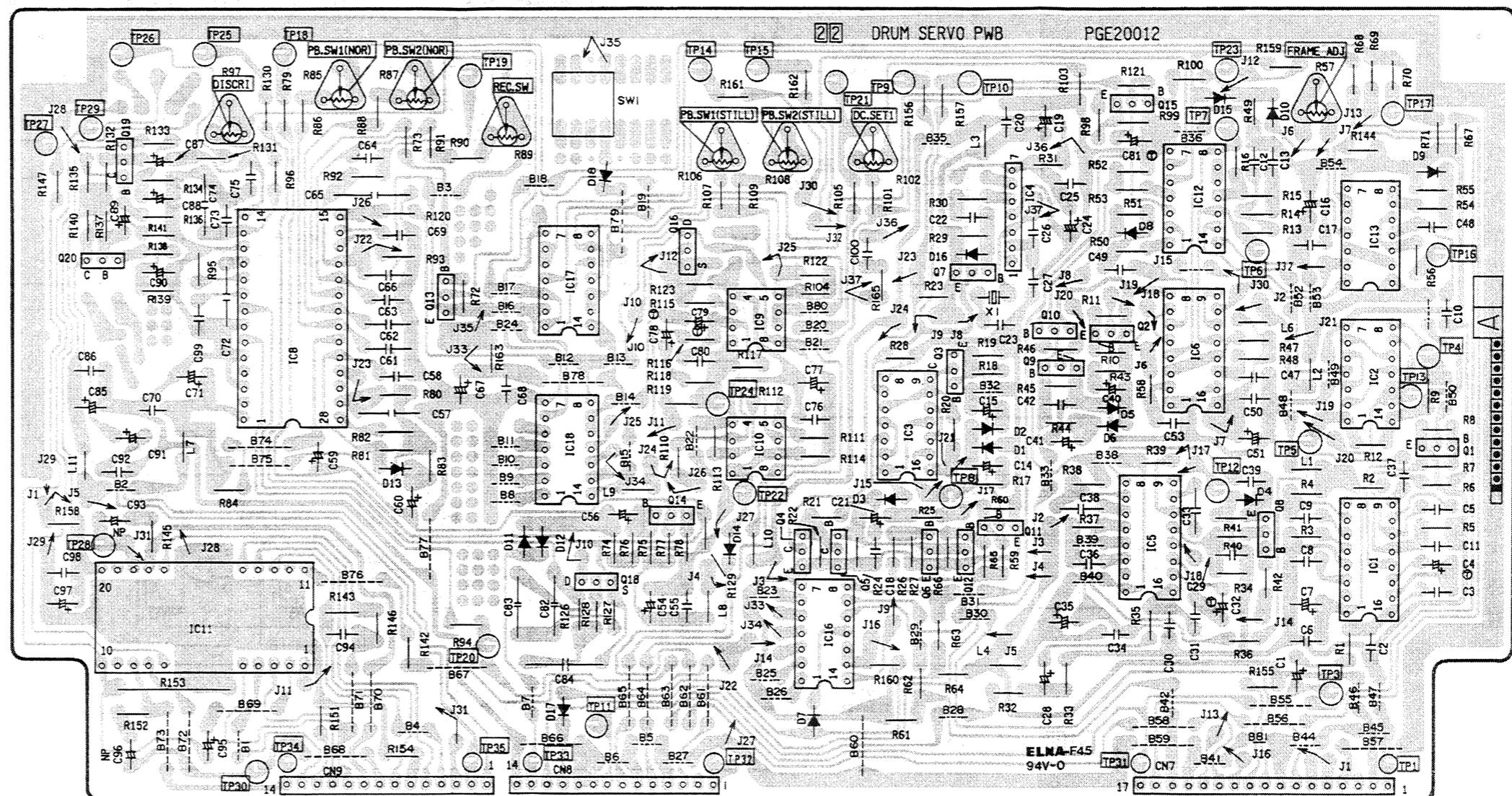
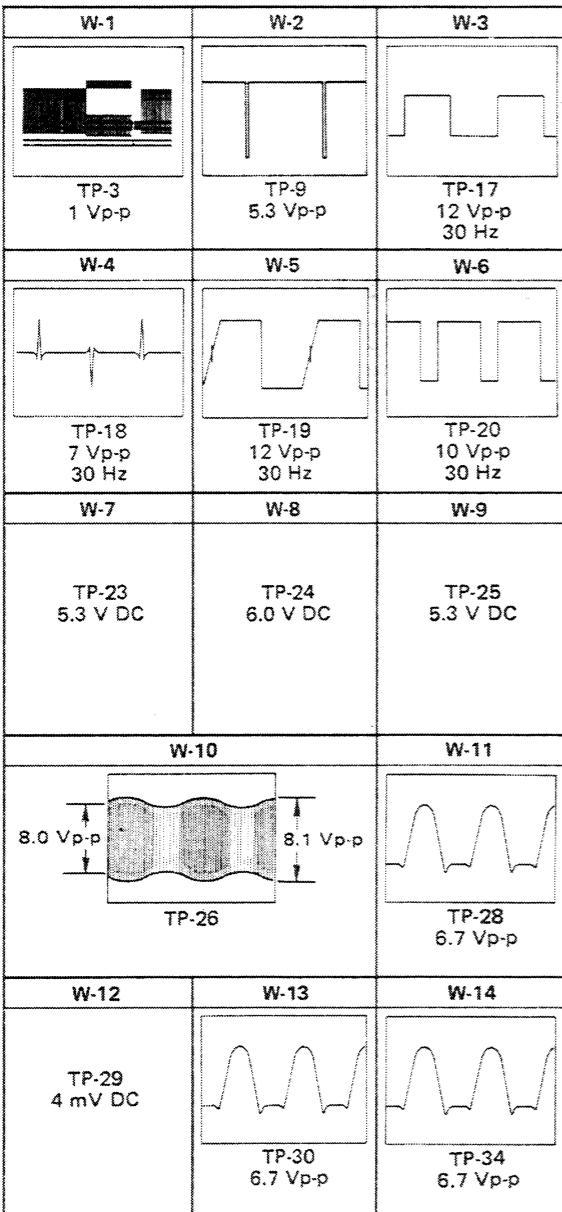
6. Shaded (■) parts are critical for safety. Replace only with specified part numbers.

7. NPN type transistors are 2SD636RS.
8. PNP type transistors are 2SB641RS.
9. All diodes are 1SS133.

A | B | C | D | E | F | G | H

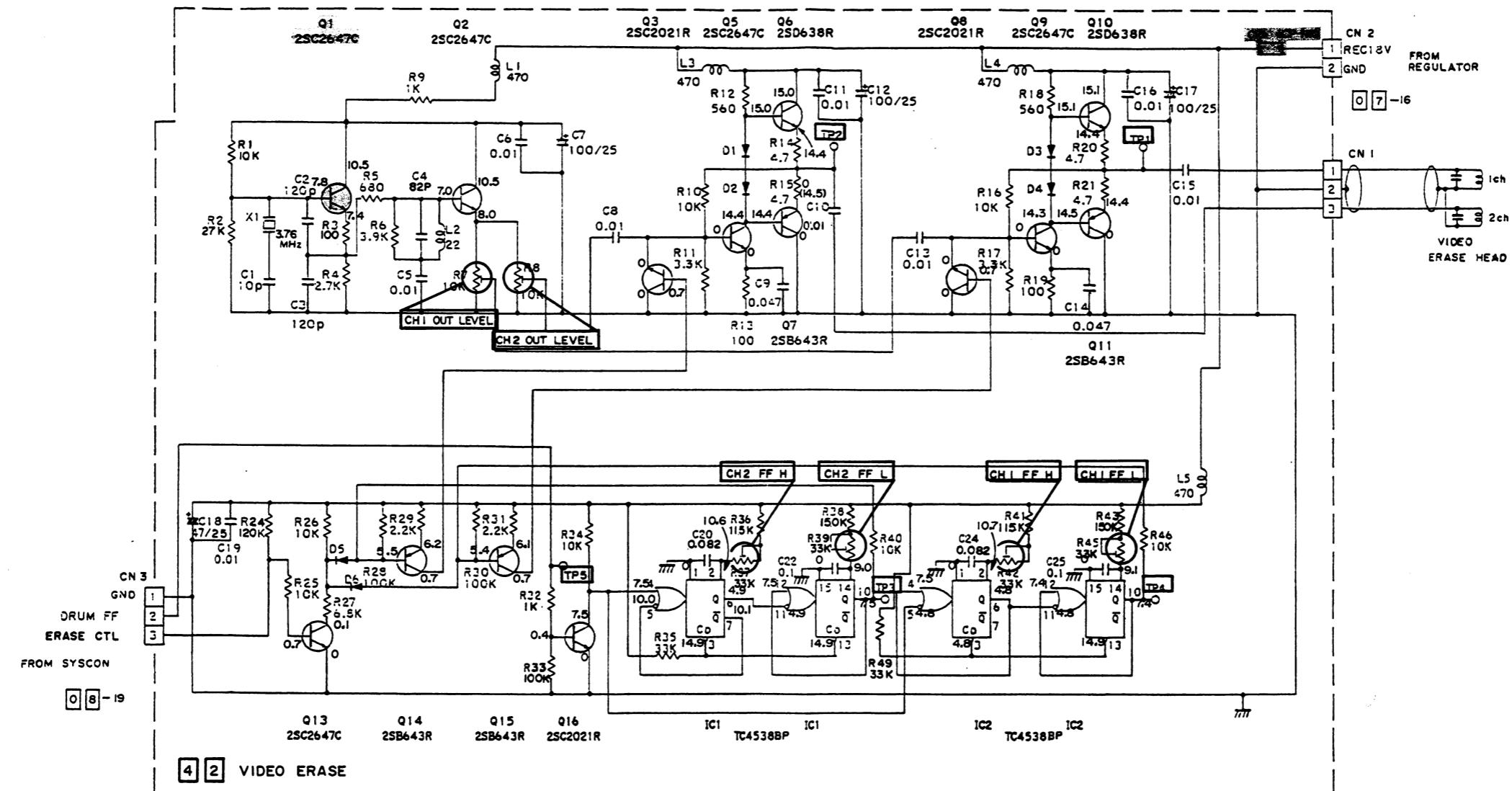
4.37 DRUM SERVO CIRCUIT BOARD

— MAIN WAVEFORMS OF
DRUM SERVO CIRCUIT —



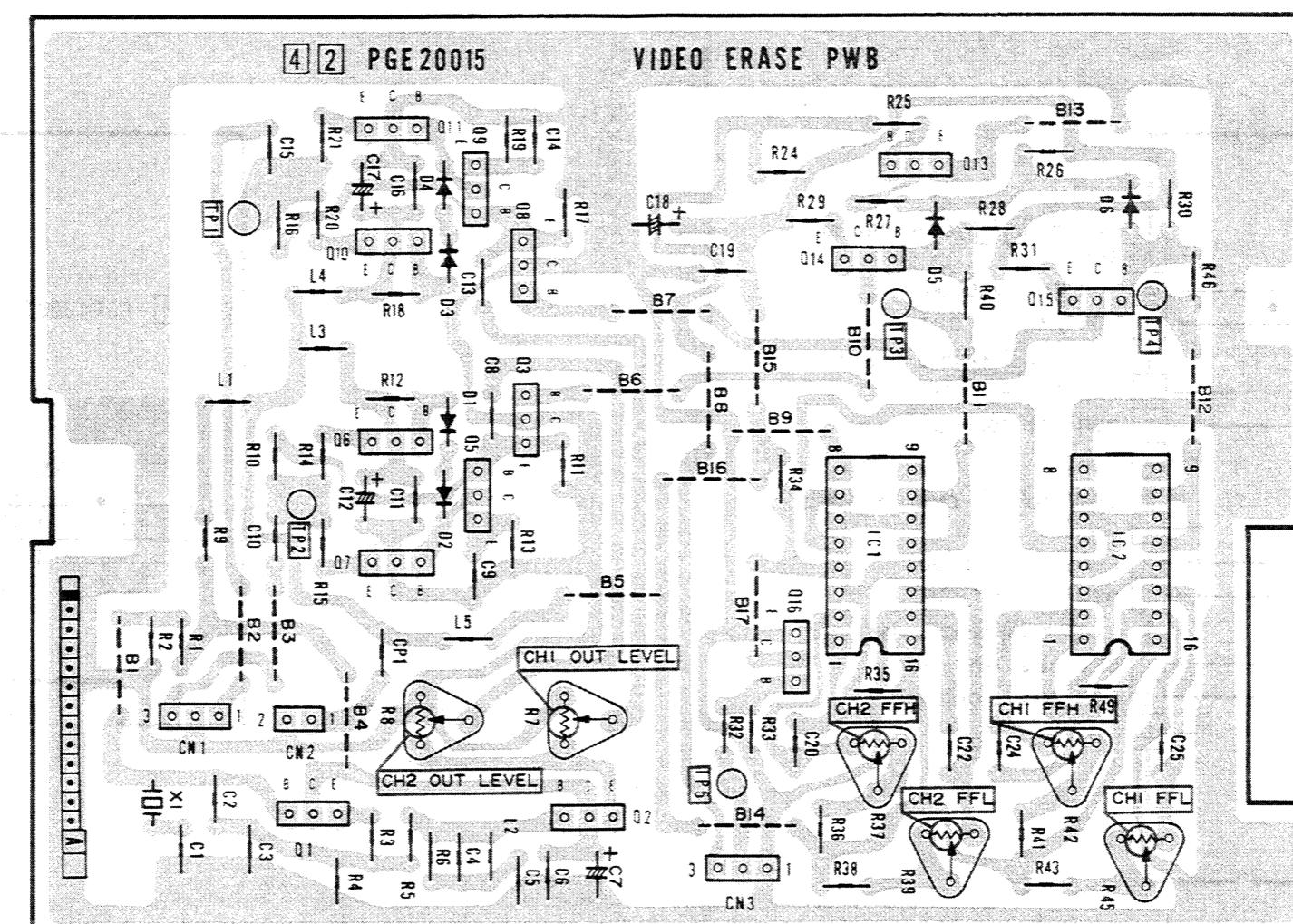
A | B | C | D | E | F | G | H

4.38 VIDEO ERASE SCHEMATIC DIAGRAM



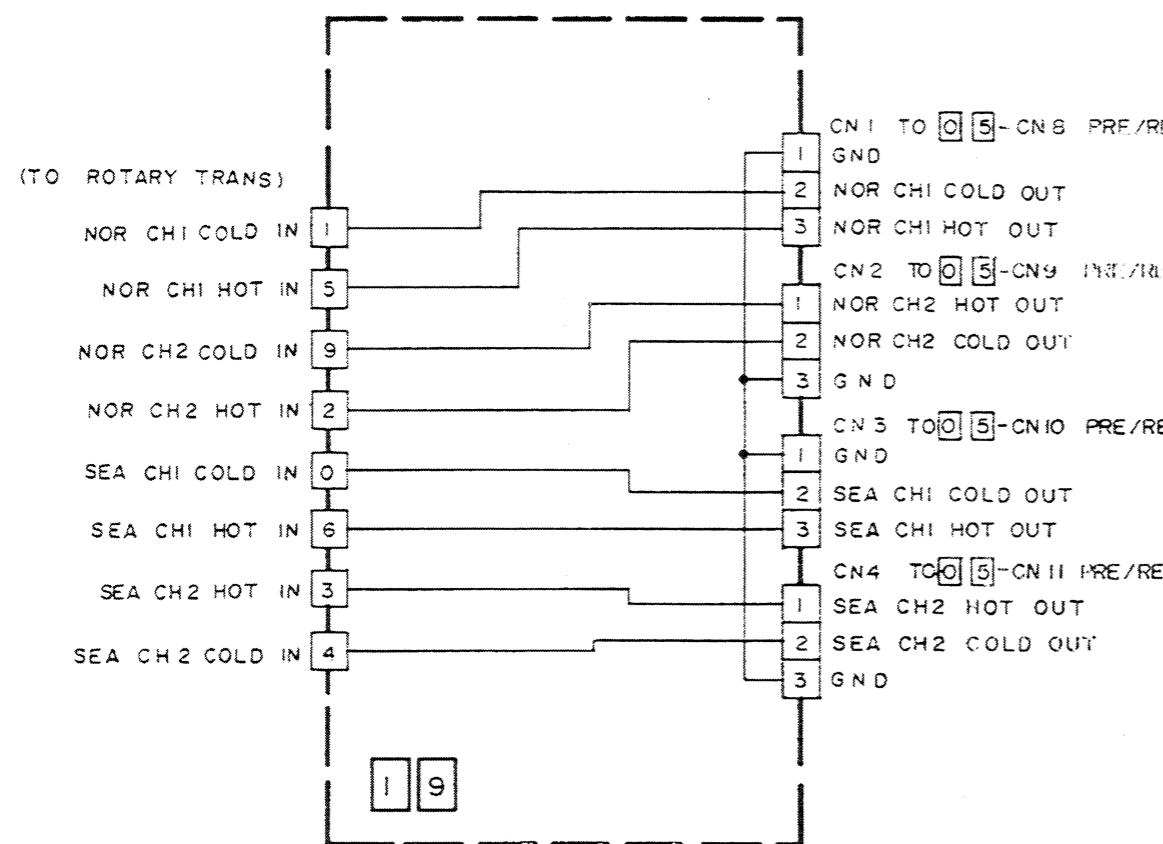
A B C D E F G H

4.39 VIDEO ERASE CIRCUIT BOARD

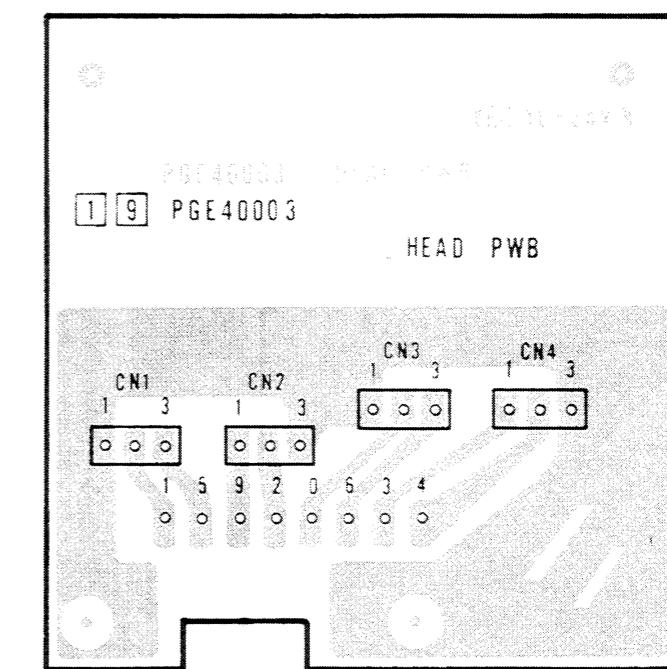


A | B | C | D | E | F | G | H

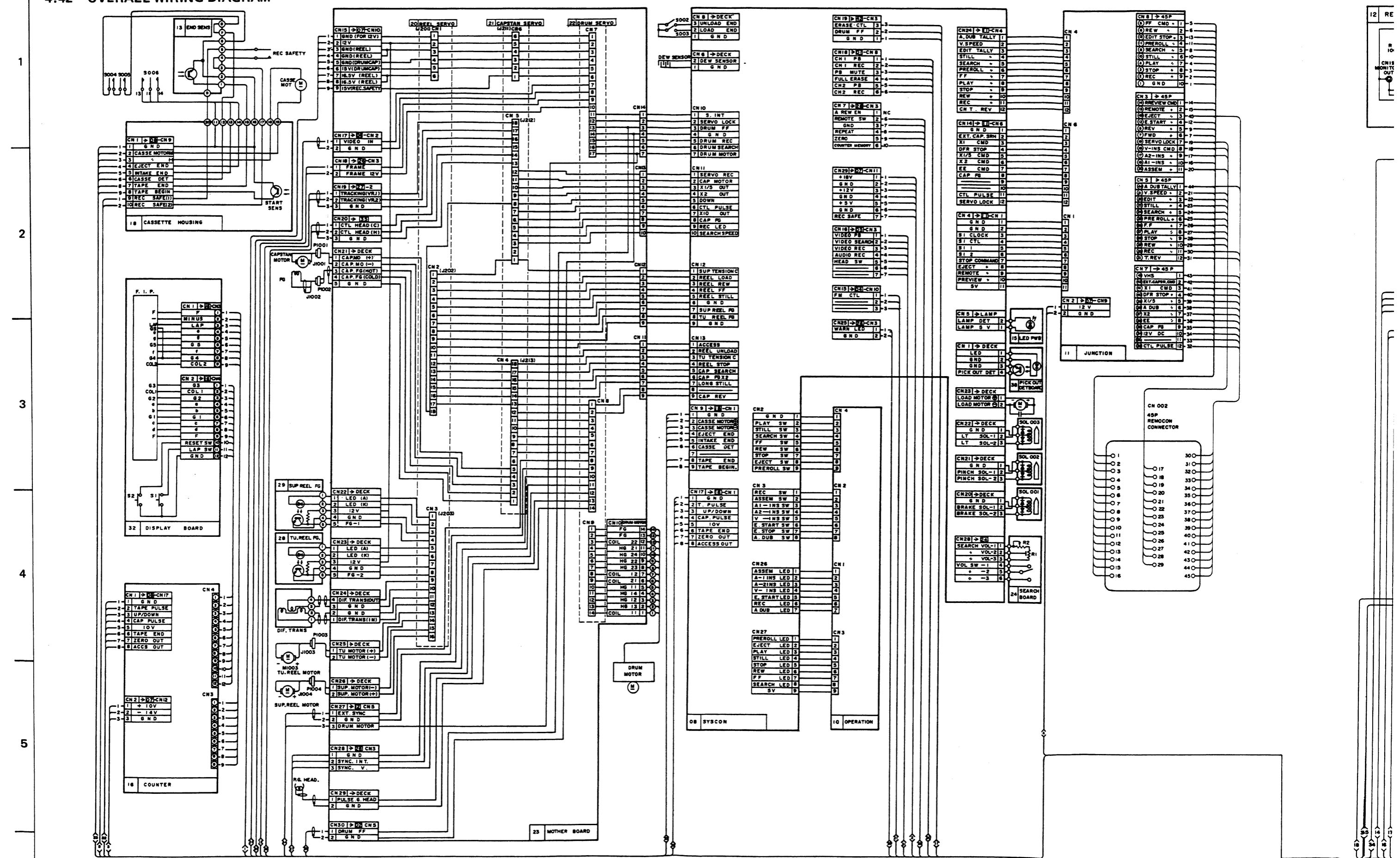
4.40 VIDEO HEAD SCHEMATIC DIAGRAM

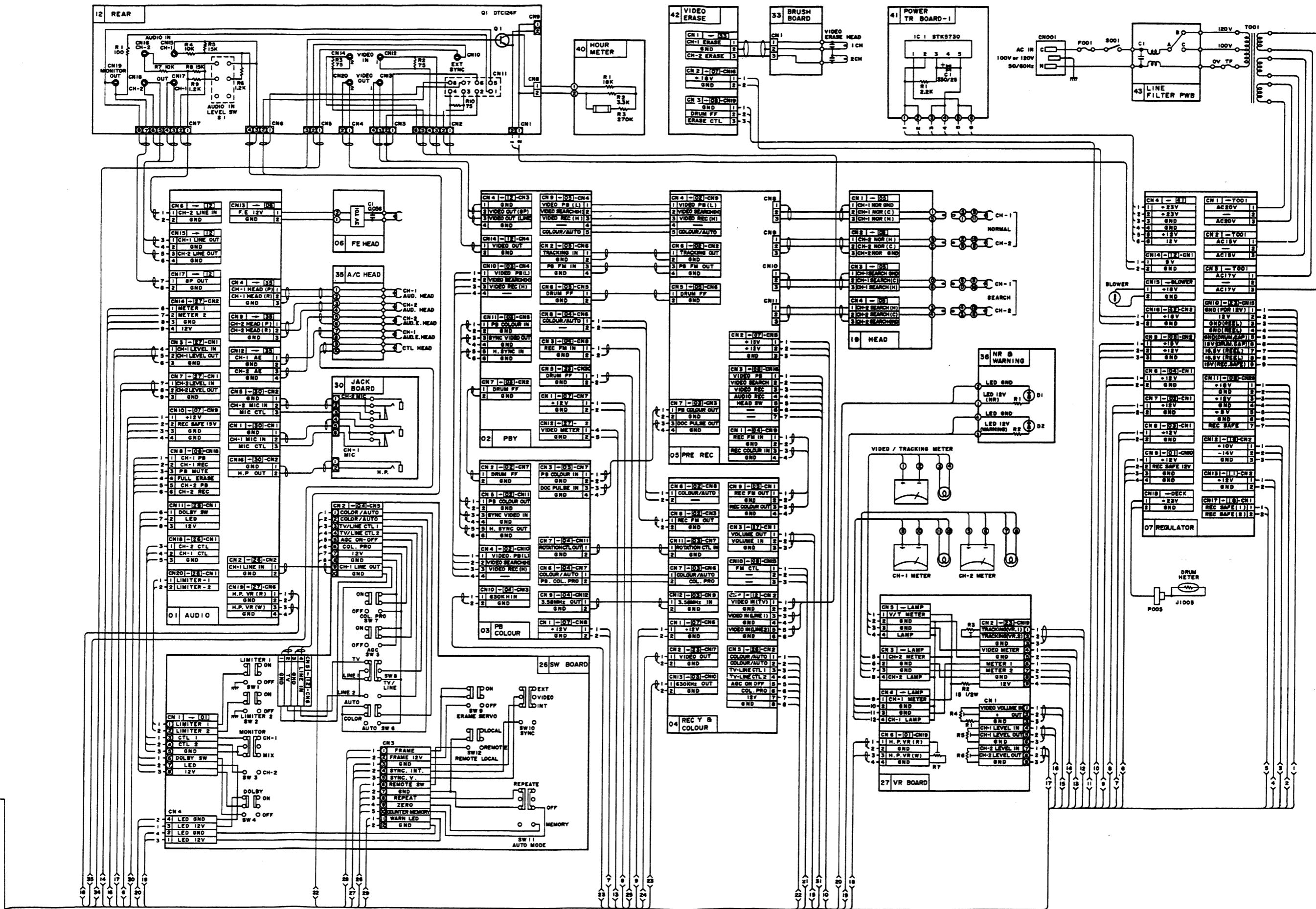


4.41 VIDEO HEAD CIRCUIT BOARD



4.42 OVERALL WIRING DIAGRAM

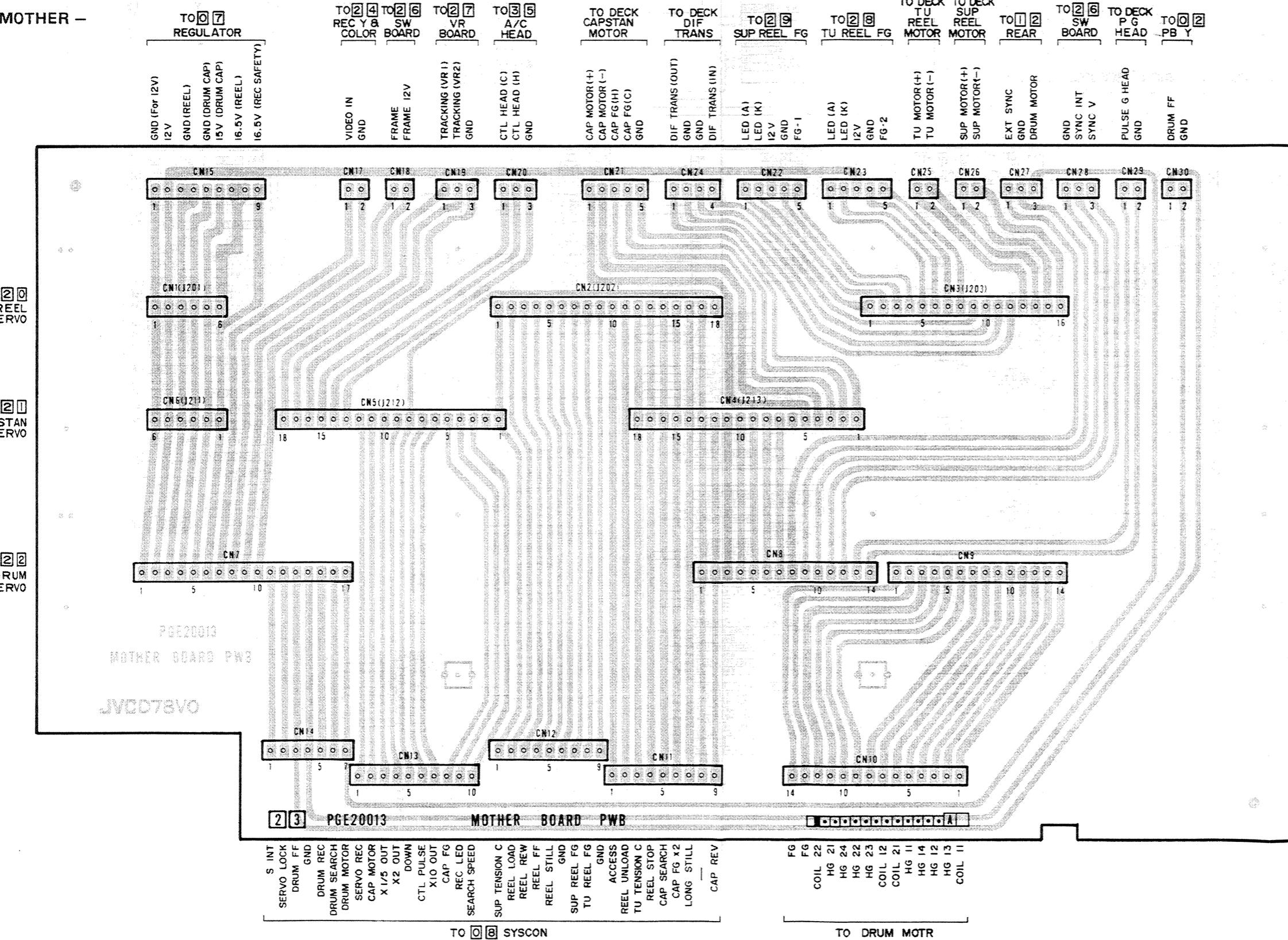




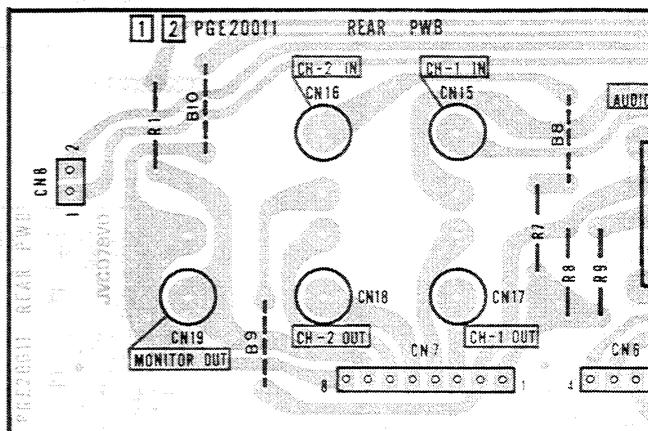
OVERALL WIRING 4-3
(REAR, MOTHER, VR & etc., BOARD)

4.43 REAR, MOTHER & SWITCH CIRCUIT BOARD

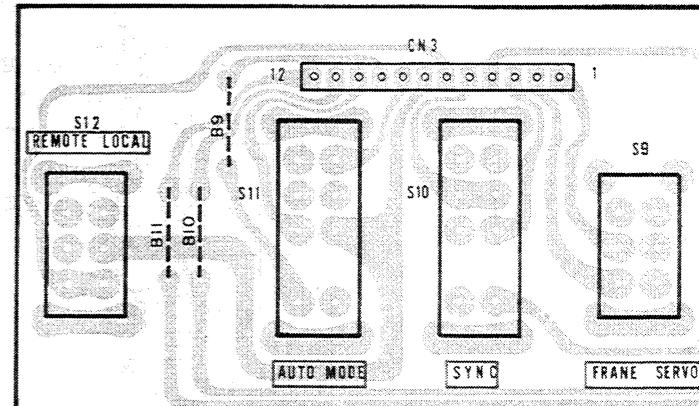
- MOTHER -



- REAR -

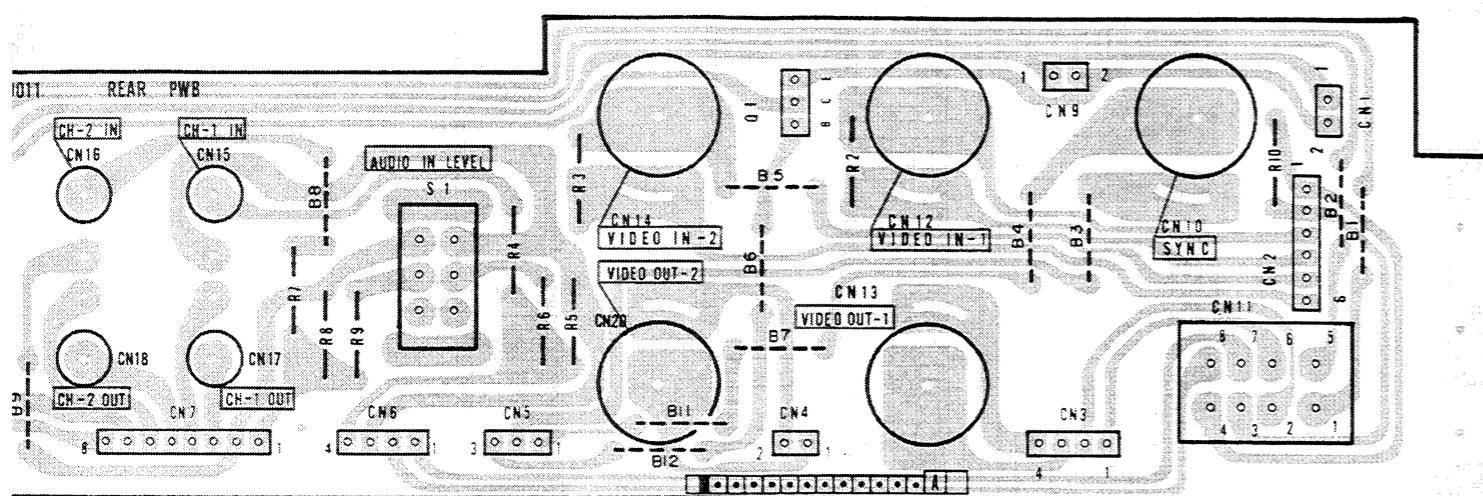


- SWITCH -

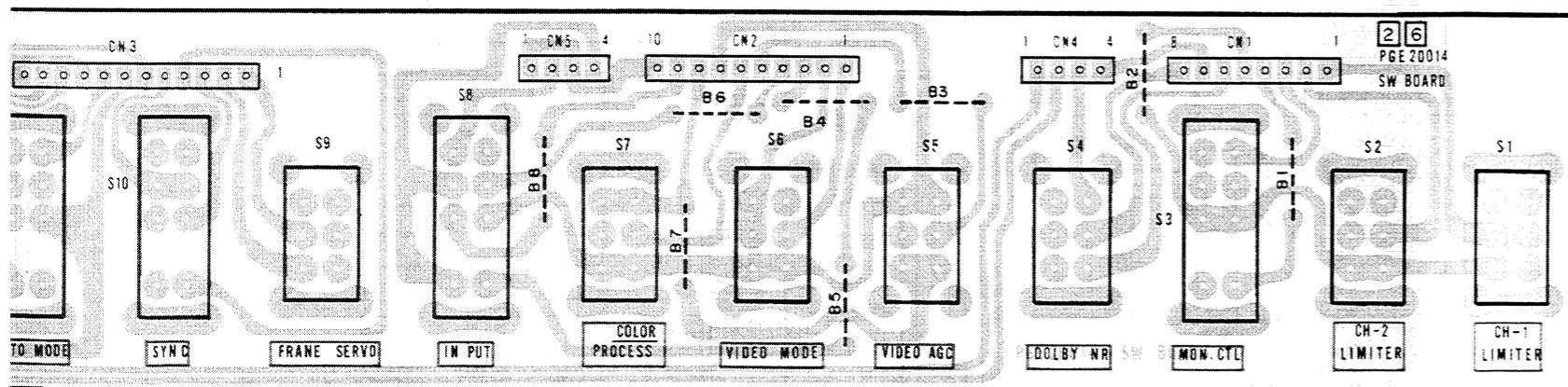
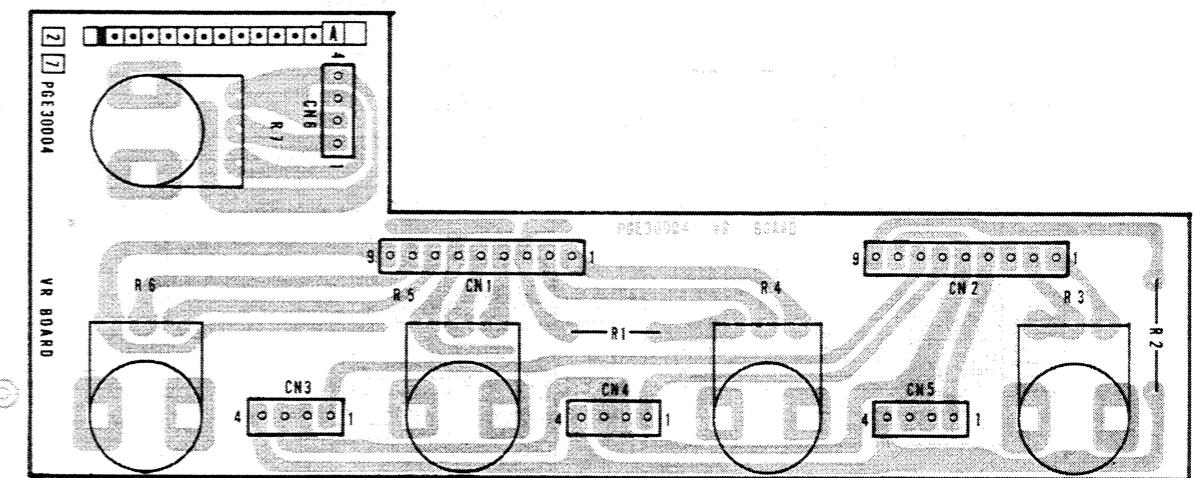


H | I | J | K | L | M | N | O | P

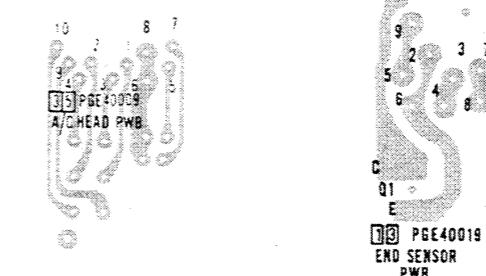
4.44 VR, A/C HEAD, END SENSOR, WARNING & NR LED CIRCUIT BOARDS



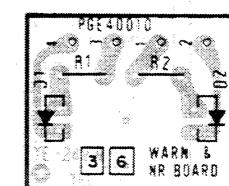
- VR -



- A/C HEAD -

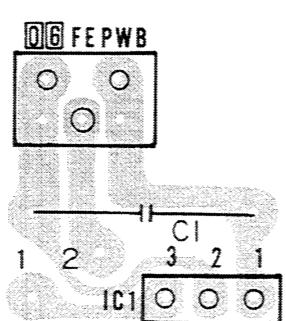


- WARNING & NR LED -

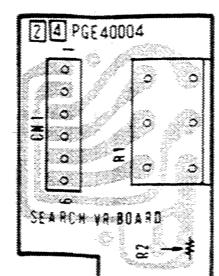


4.45 FULL ERASE HEAD, SERACH VR, HOUR METER AND JACK CIRCUIT BOARDS

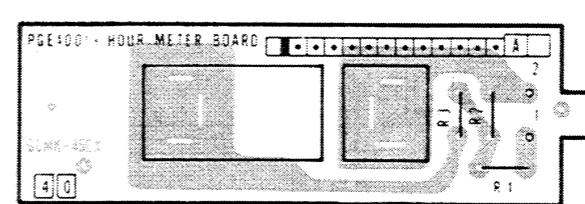
- FULL ERASE HEAD -



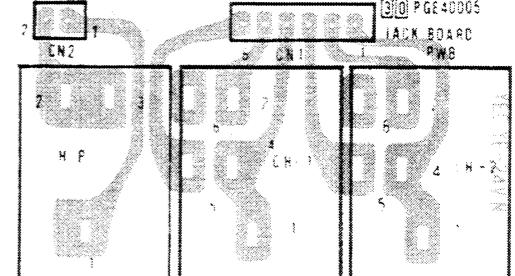
- SERACH VR -



- HOUR METER -

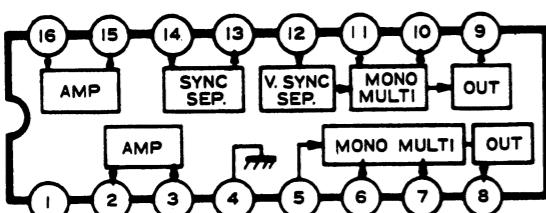


- JACK -

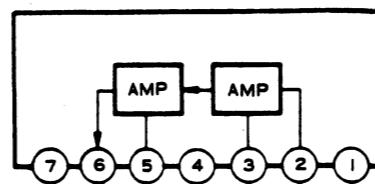


4.46 IC BLOCK DIAGRAM

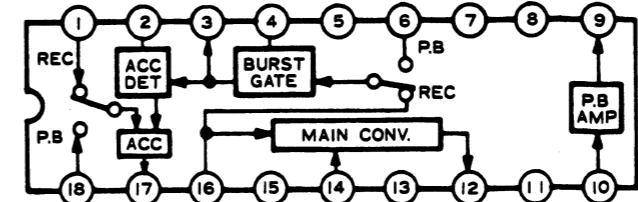
- AN301 -



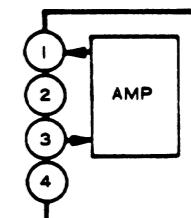
- AN360 -



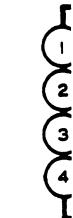
- AN6360 -



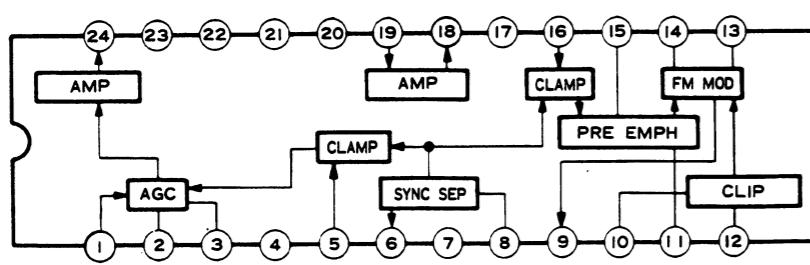
- AN607P -



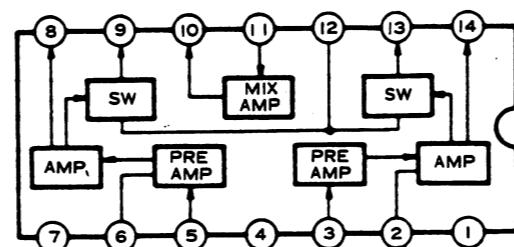
- AN6



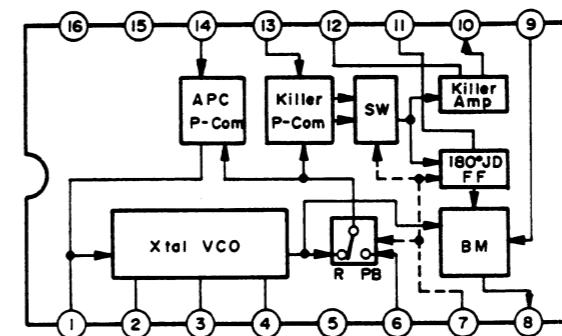
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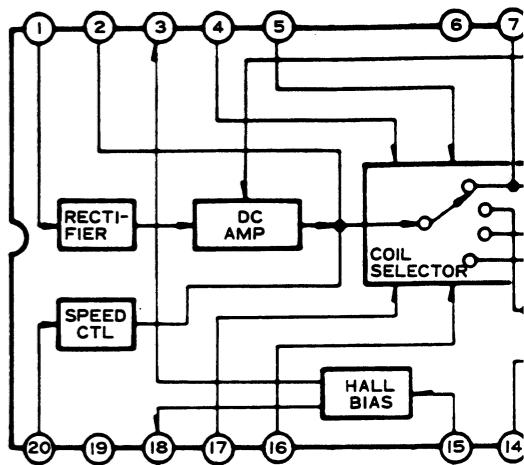
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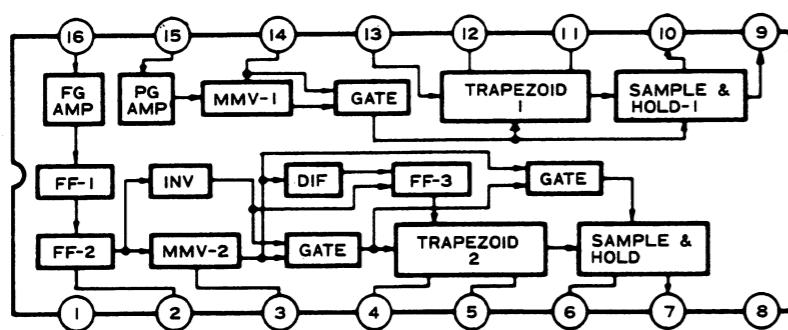
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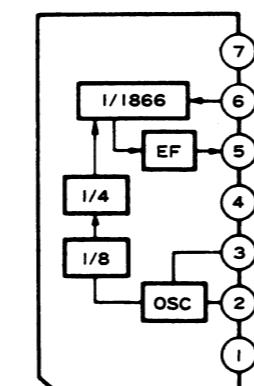
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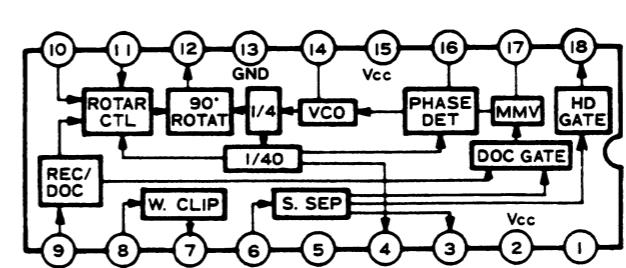
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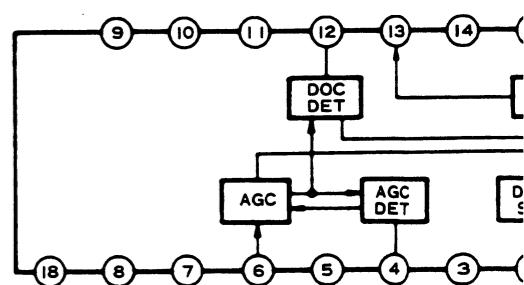
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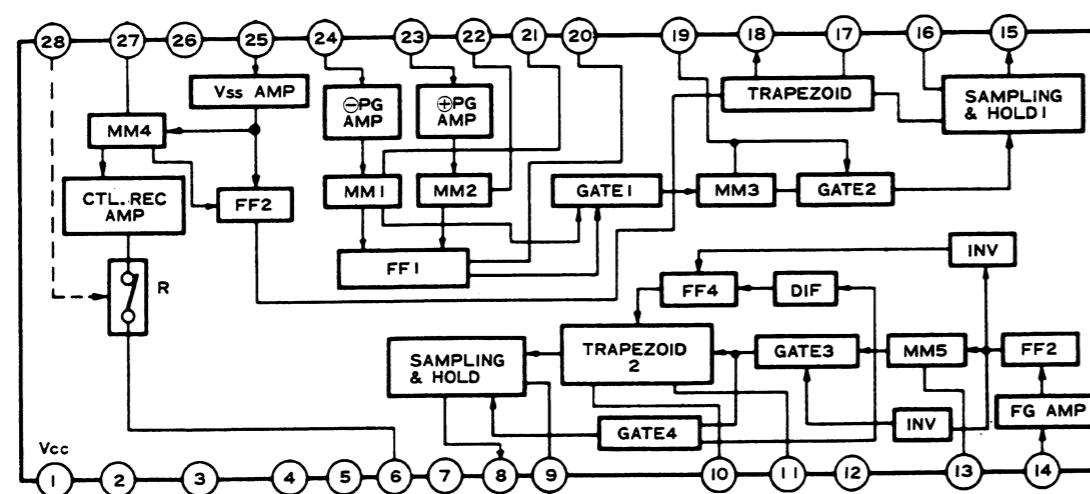
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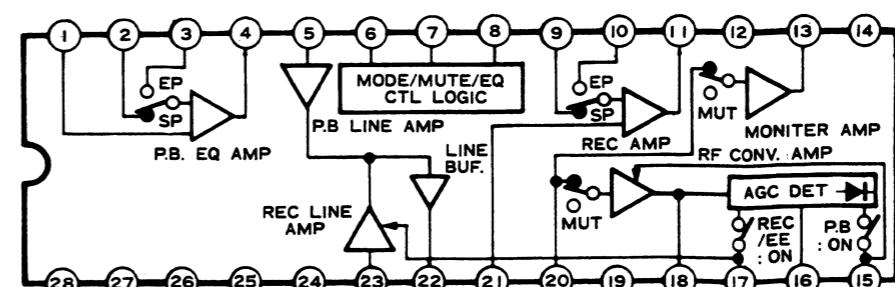
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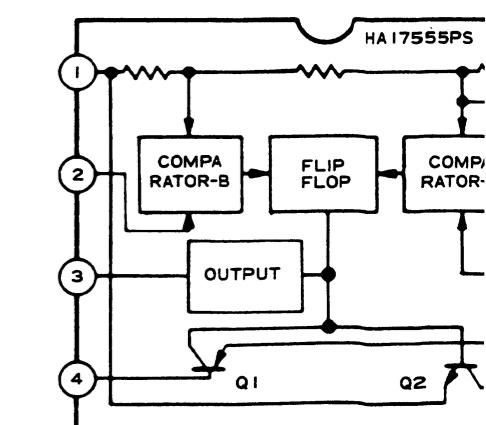
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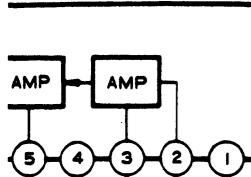
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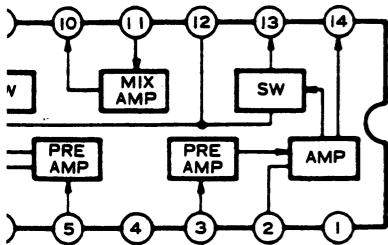
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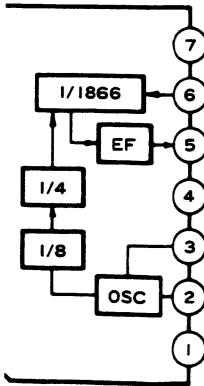
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42N -

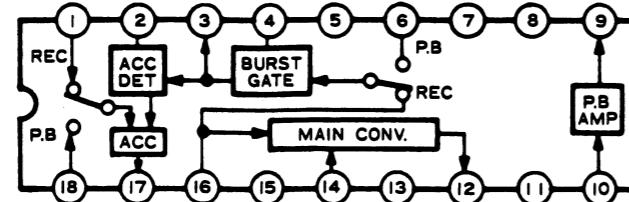


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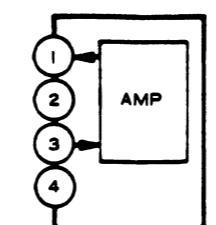
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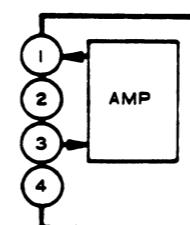
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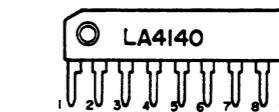
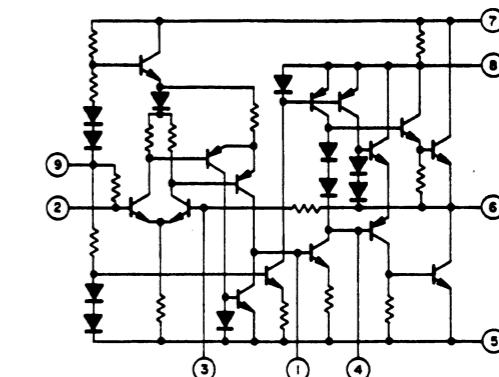
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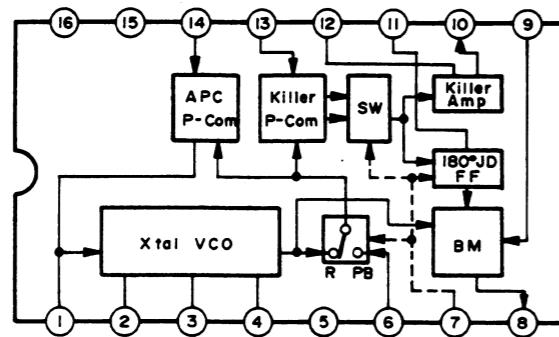
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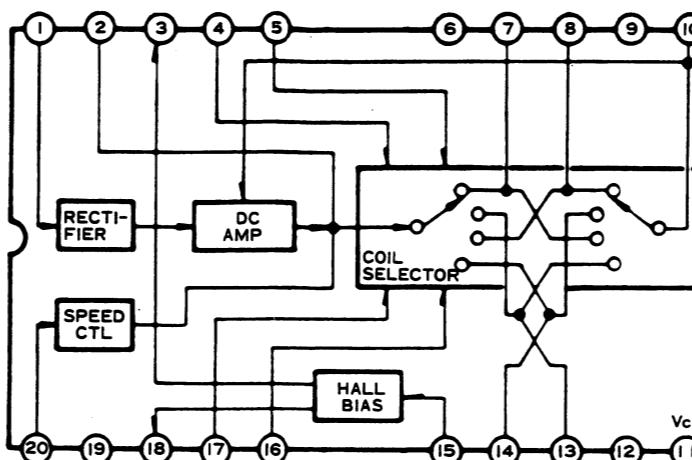
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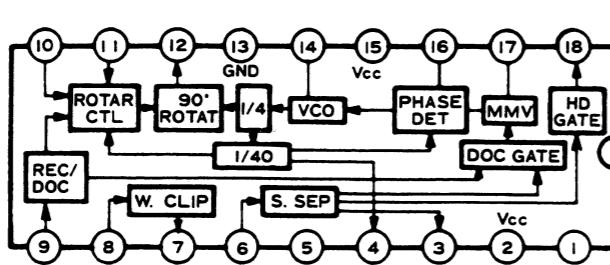
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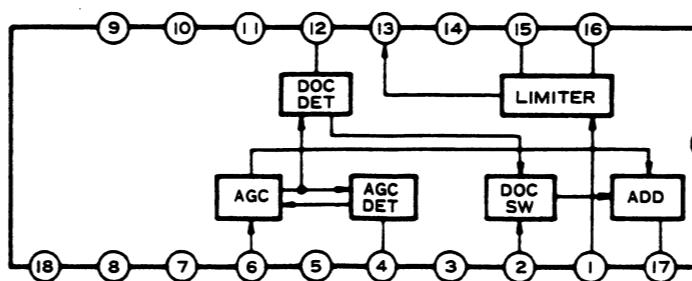
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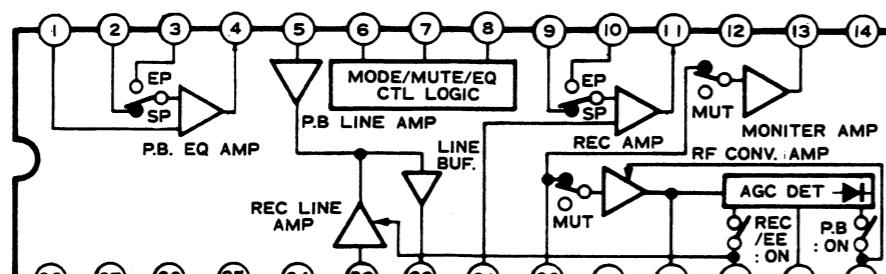
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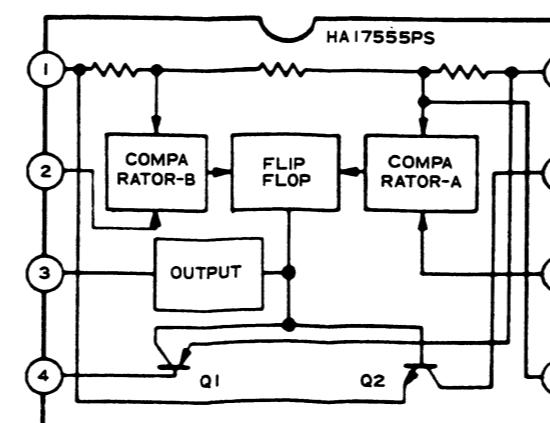
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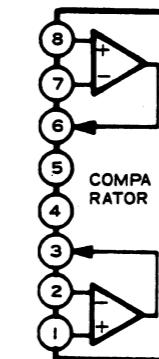
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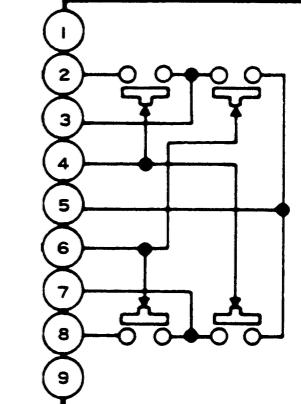
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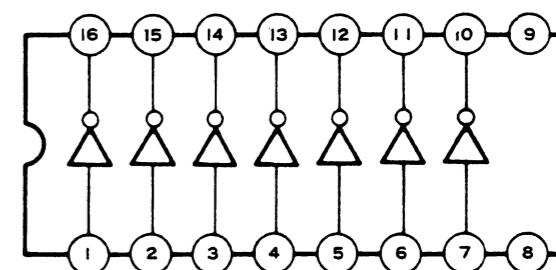
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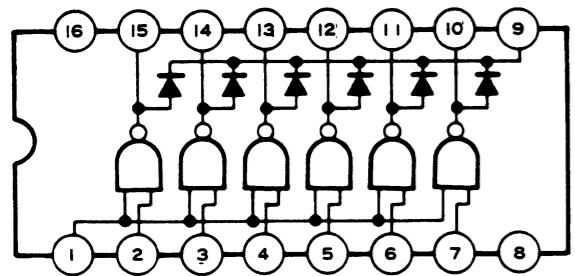
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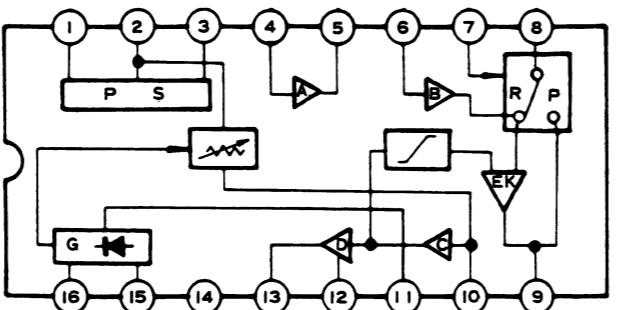
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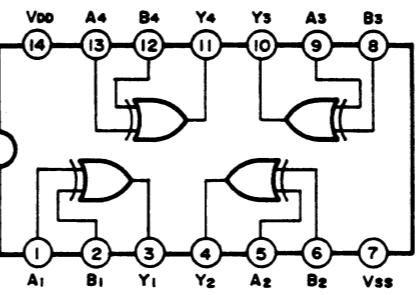
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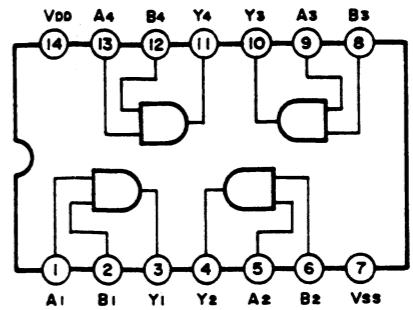
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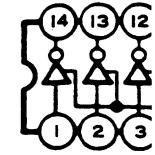
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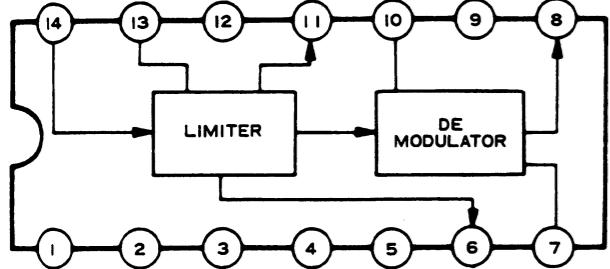
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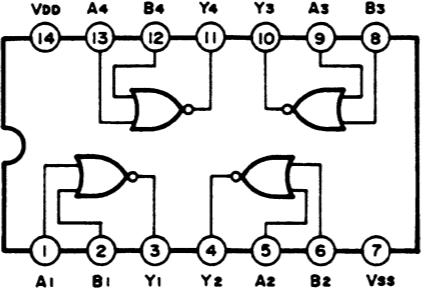
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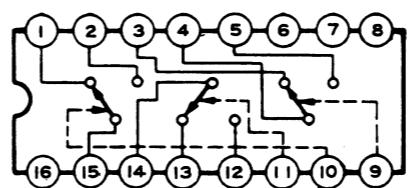
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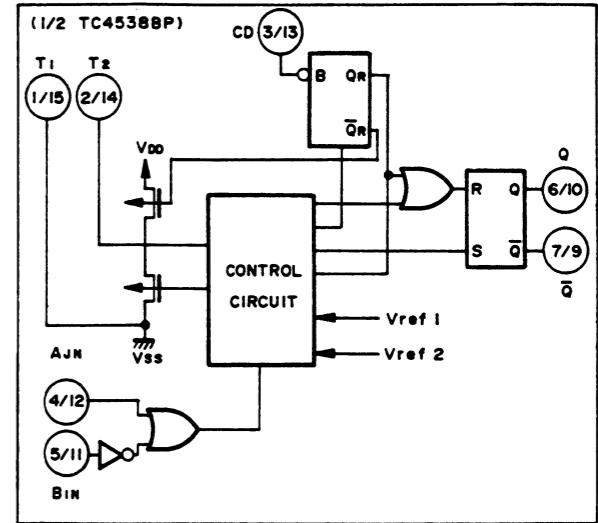
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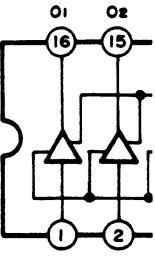
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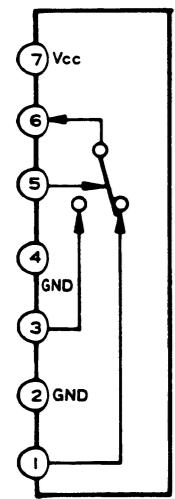
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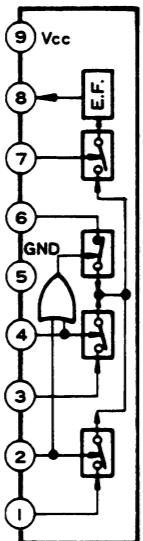
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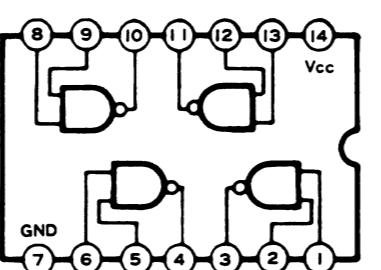
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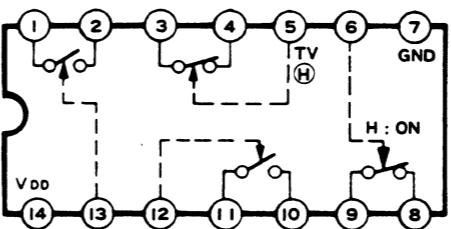
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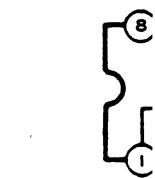
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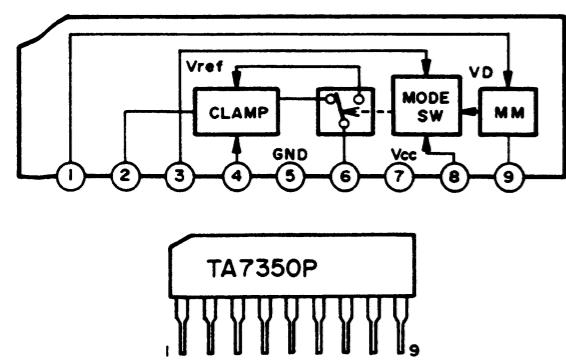
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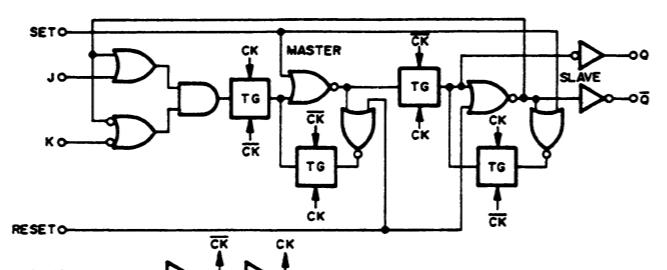
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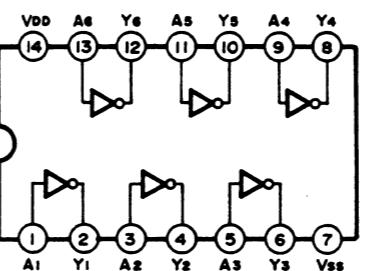
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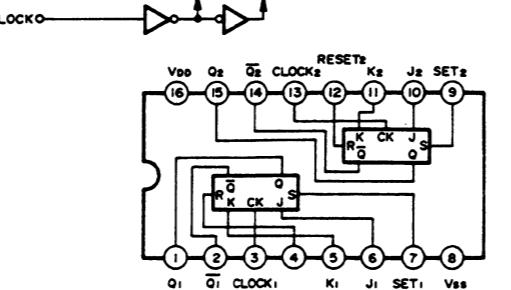
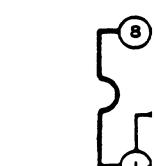
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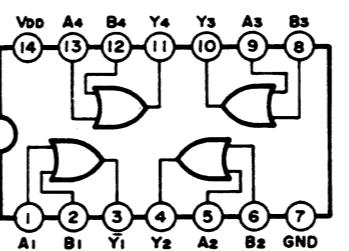
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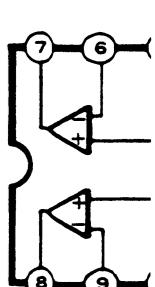
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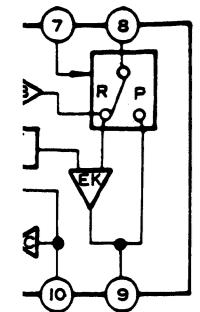
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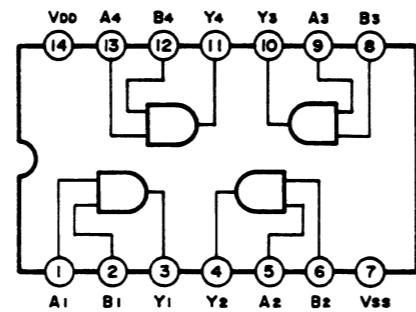
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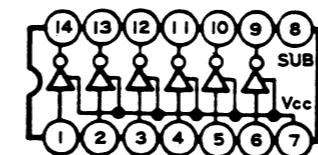
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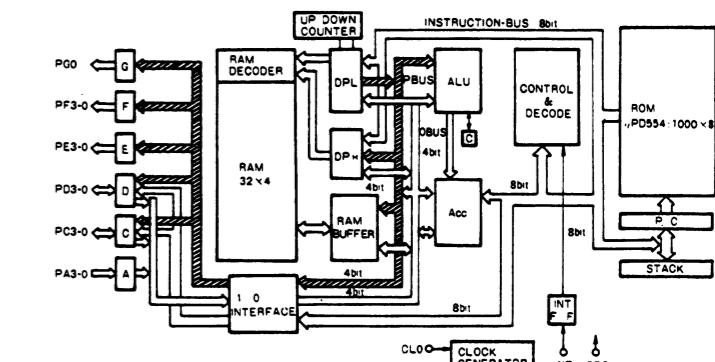
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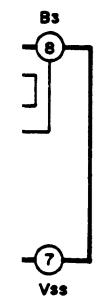
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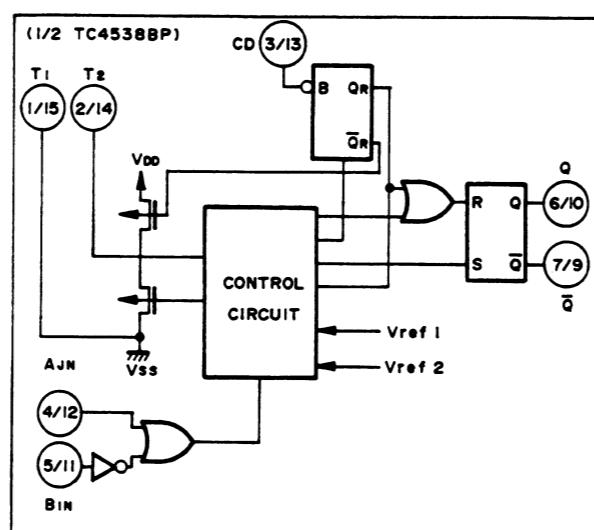
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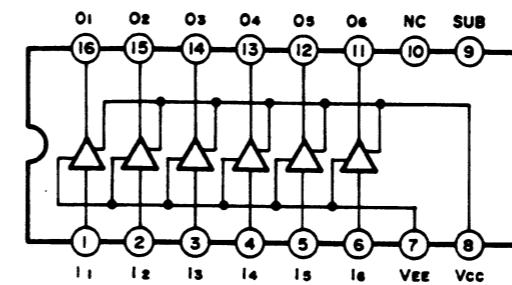
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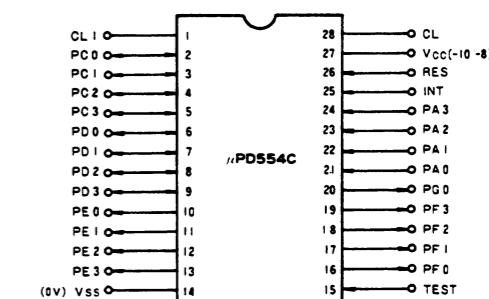
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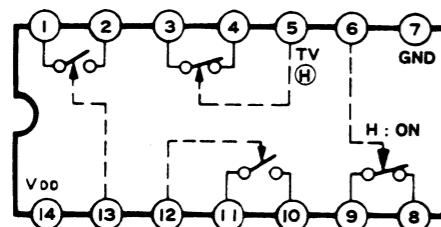
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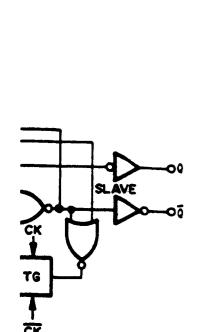
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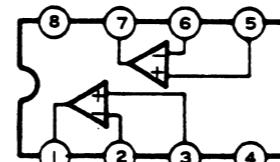
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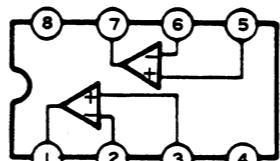
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A1N	H H	OUTPUT ENABLE
J	L H L H	INHIBIT
H	L H L H	INHIBIT
L	L H	OUTPUT ENABLE
*	* L L H	INHIBIT

* Don't Care

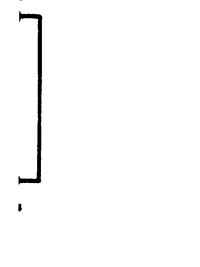
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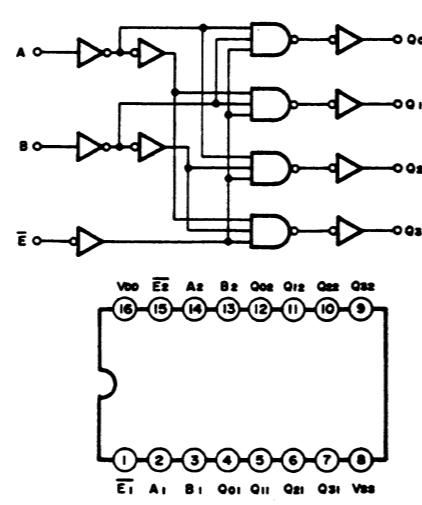
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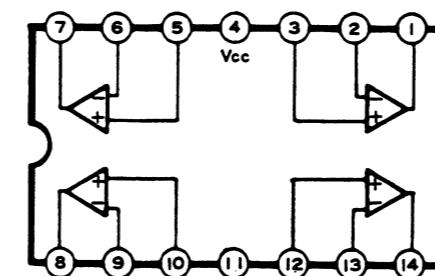
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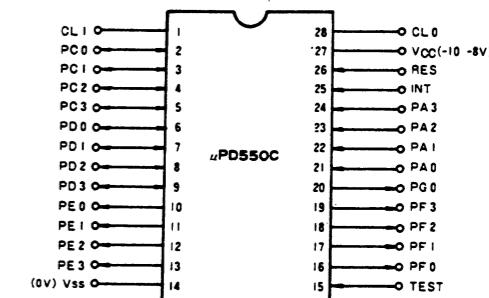
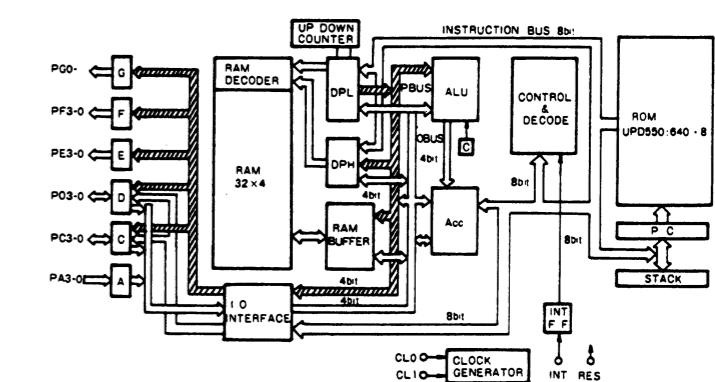
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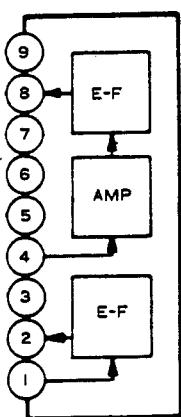
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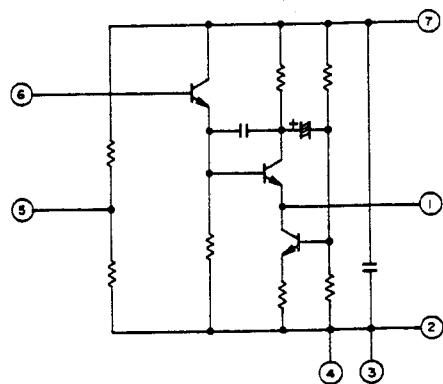
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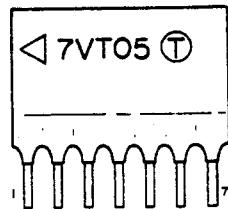
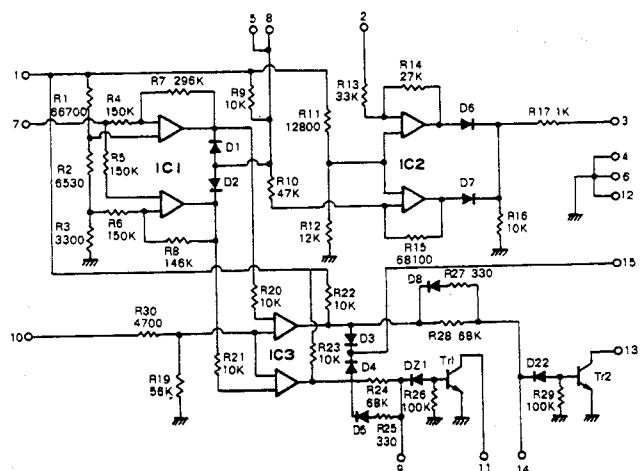
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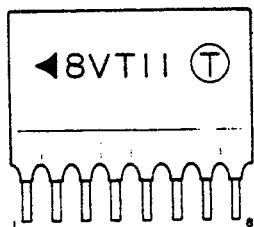
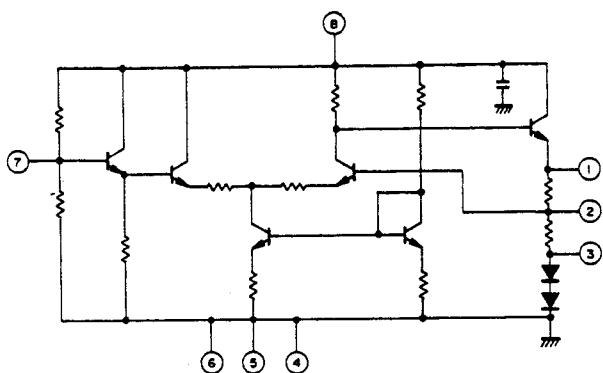
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- 15VT01 -



- 8VT11 -



SECTION 5

EXPLODED VIEWS AND PARTS LIST

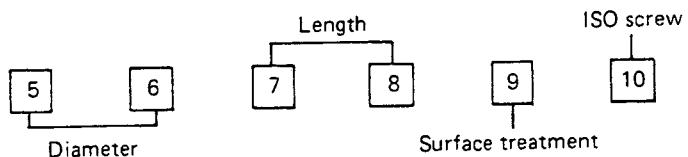
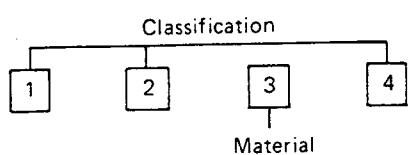
SAFETY PRECAUTION

Parts identified by the Δ symbol are critical for safety.
Replace only with specified part numbers.

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5.1 STANDARD PART NUMBER CODING

5.1.1 Screw coding



Classification (first digit)

Symbol Letter	Name
S	Normal screw
N	Assembly screw
L	"
D	"
M	W. Wood screw
F	Feather screw
T	Set screw
Y	"
B	Bolt
N	Nut
W	Washer
R	E-ring
E	Eyelet
P	Spring

Shape of Screw Head (second digit)

Symbol Letter	Shape of Screw Head
P	Pan head
S	Flat countersunk head
H	Oval countersunk head
D	Binding head
R	Round head
B	Round head
T	Truss head

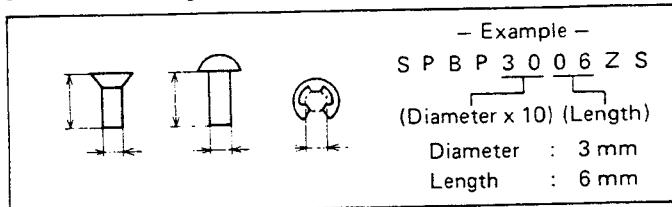
Material (third digit)

Symbol Letter	Material
S	Steel
E	Stainless steel
C	Cast iron
U	Bronze
B	Brass
P	Phosphor bronze
N	German silver
Y	Brass
A	Aluminum
Z	Zinc alloy
K	Polycarbonate

Type of Screw (fourth digit)

Symbol Letter	Type of Screw
P	Cross-Recessed head screw
A	Tapping screw
B	Special tapping screw
T	Special tapping screw
E	Special tapping screw

Diameter and Length of Screw (fifth – eighth digit)



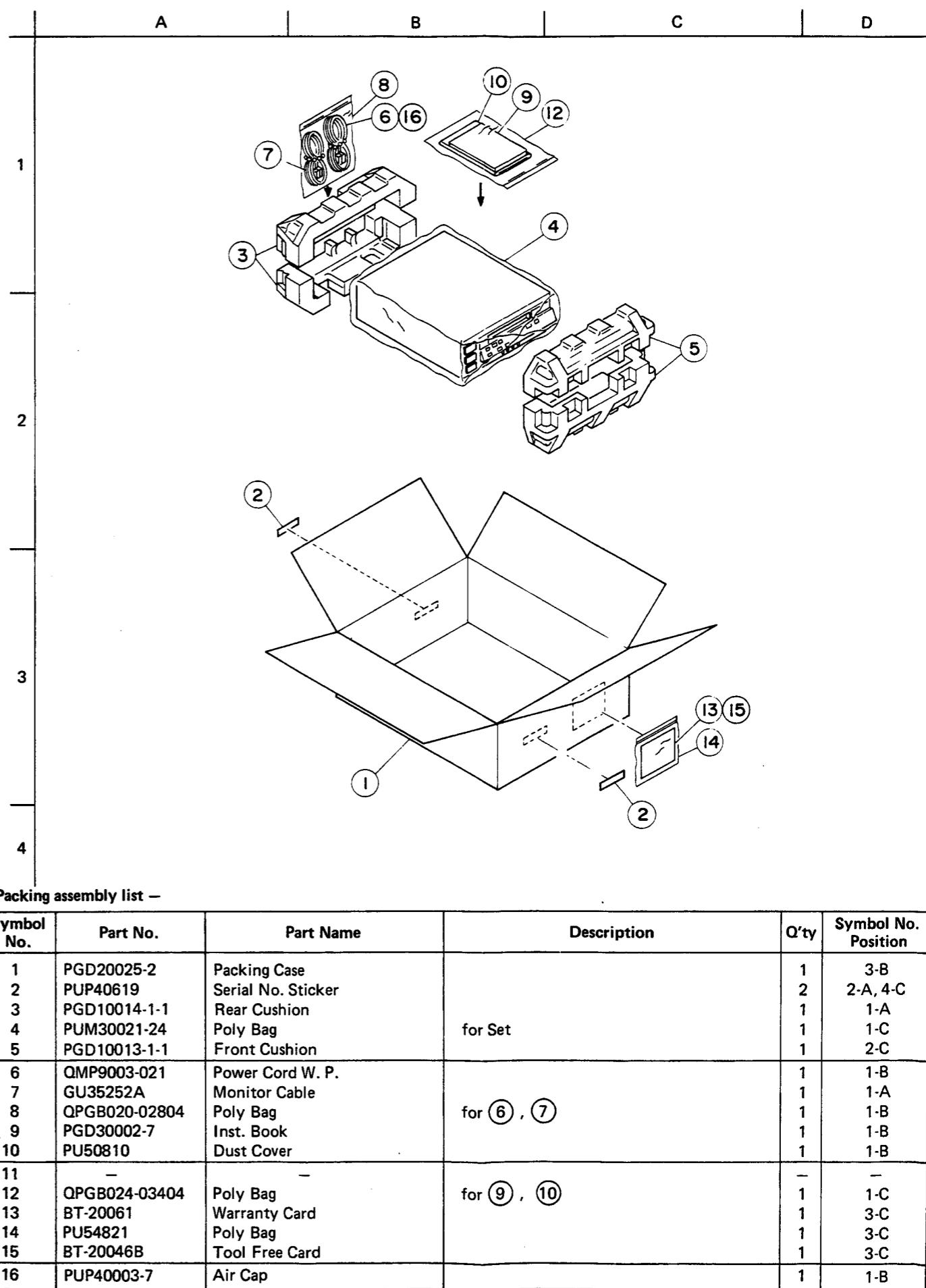
Surface Treatment (ninth digit)

Symbol Letter	Surface Treatment
Z	Galvanization, dichromic acid treatment (MFZn2-C)
N	Nickel plating (MFNi2, MFNi1)
R	Chrome plating (MBCr2, MBCr1)
G	Silver plating (SP4)
W	Nichrome platings
P	Phosphite treatment
B	Bronze plating

Symbol letter	Surface treatment
M	Black coloring after galvanization
A	Red coloring after galvanization
C	Blue coloring after galvanization
T	Green coloring after galvanization
V	Violet coloring after galvanization
F	Iron with black coloring

5.2 EXPLODED VIEWS AND PARTS LIST

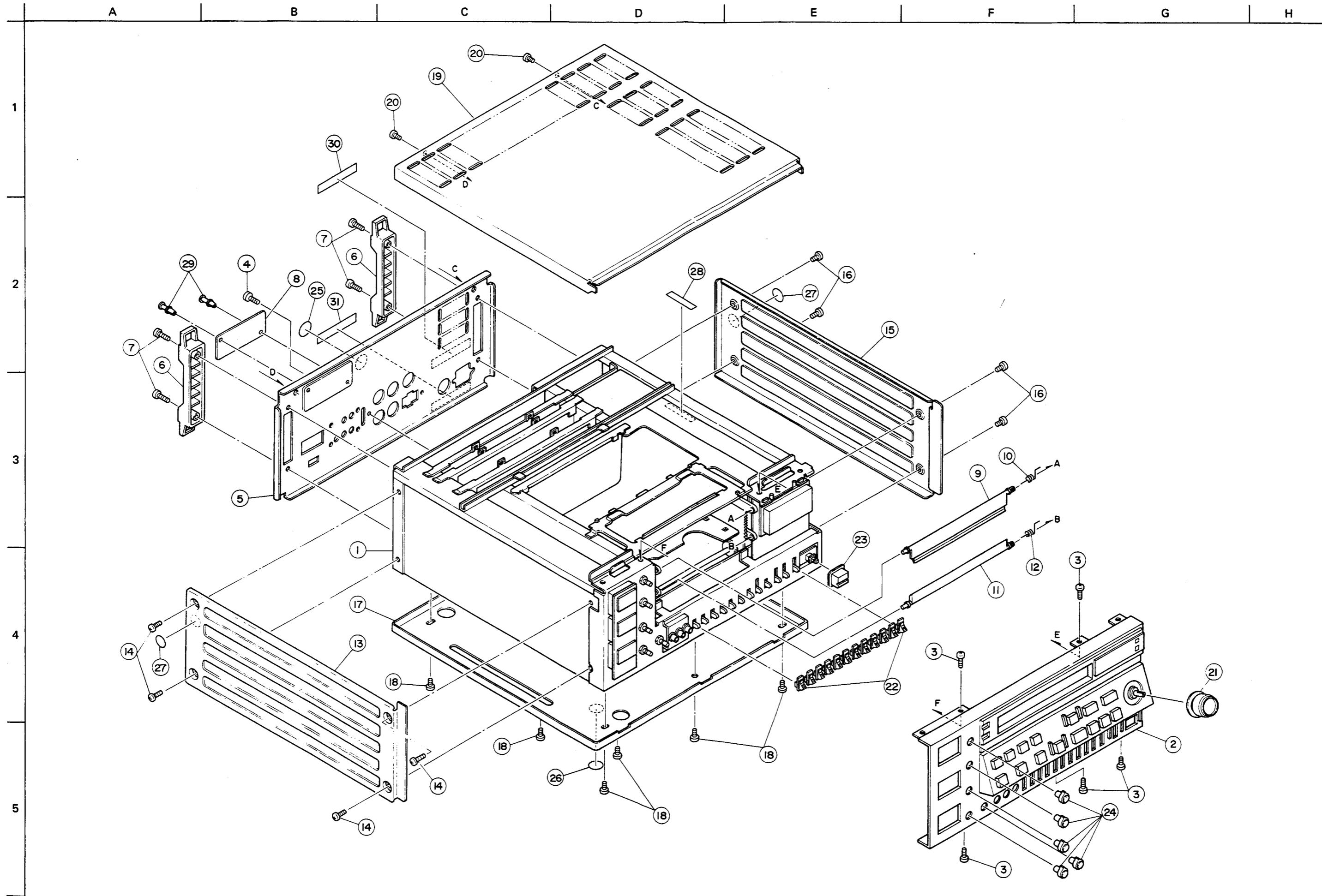
5.2.1 Packing assembly



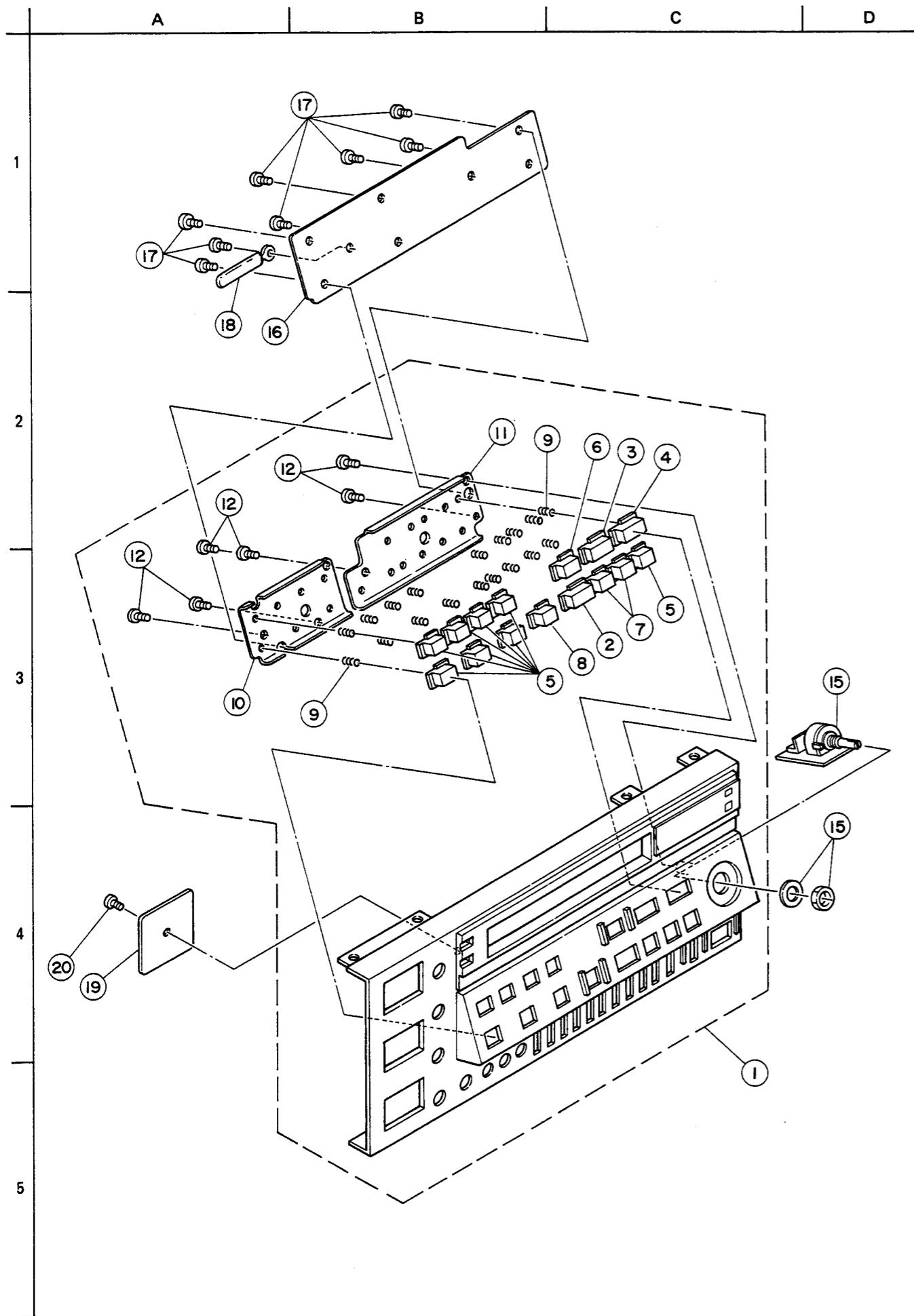
5.1.2 Fuse coding

COMMON SYMBOL	Shape of Fuse	Rated Voltage	Values
Symbol No.	Shape	Remarks	
51		ø 5.2 x 20	
60		ø 6.4 x 30	
61		ø 6.35 x 31.8	
63		With 60 Lead Wire	
66		With 61 Lead Wire	
Characteristic			
Symbol No.	Fusing current	Fusing time	Remarks
S	160%	Within 1 hr.	Anti-rush Type
	200%	" 2 min.	
	700% – 2000%	" 0.01 sec.	
R	160%	" 1 hr.	Regular Fusible Type
	200%	" 2 min.	
M	135%	" 1 hr.	Regular Fusible Type (for UL)
	200%	" 2 min.	
U	135%	" 1 hr.	Anti-rush Type (for UL)
	200%	" 2 min.	
	800% – 2000%	" 0.01 sec.	
A	210%	" 2 min.	Anti-rush Type (for Europe)
	275%	0.5 – 10 sec.	
	400%	0.15 – 2 sec.	
	1000%	0.02 – 0.3 sec.	
B	210%	Within 30 min.	Regular Fusible Type (for SEMKO, Europe)
	275%	0.05 – 2 sec.	
	400%	0.01 – 0.3 sec.	
C	135%	Within 1 hr.	Anti-rush Type (for UL, Japan)
	200%	" 2 min.	

5.2.2 Cabinet assembly



5.2.3 Front panel assembly



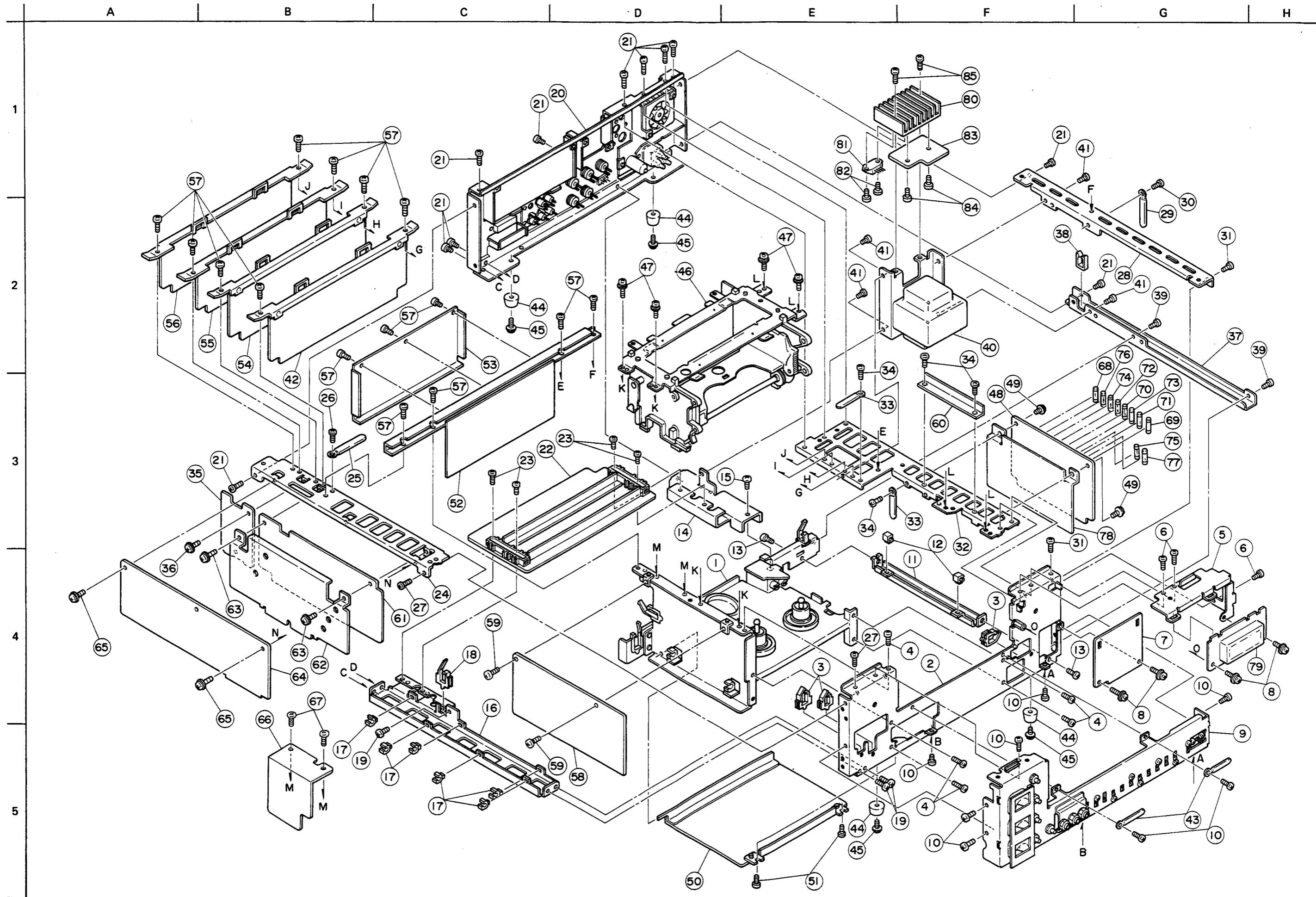
— Cabinet assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	—	Chassis Ass'y	See Sec. 5.2.4	1	4-B
2	—	Front Panel Ass'y	See Sec. 5.2.3	1	5-G
3	SDST3006R	Screw		5	4-G, F, 5-F, -G
4	SDBP3006R	"		1	2-B
5	PGD20013-2	Rear Panel		1	2-B
6	PU51215	Foot		2	2-A, -B
7	SDBP4025M	Screw		4	2-A, -B
8	PU33828-5	Serial No. Plate		1	2-B
9	PQ30107V	Upper Door Ass'y		1	3-F
10	PQ40104-2	Spring		1	3-F
11	PQ30030-1-12	Lower Door		1	4-F
12	PQ40472	Spring		1	4-F
13	PGD20007	L. Side Panel		1	4-B
14	SDBP4006R	Screw		4	4-A, 5-B, -C
15	PGD20008	R. Side Panel		1	2-E
16	SDBP4006R	Screw		4	2-E, 3-F
17	PU10364-2	Bottom Cover		1	4-B
18	SBST3006Z	Tapping Screw		6	4-C, 5-C, D, -E
19	PU10365-3	Top Cover		1	1-C
20	SDBP3006R	Screw		2	1-C
21	PGD40035A	Search VR Knob Ass'y		1	4-G
22	PGD40023	Slide Knob		12	4-E
23	PGD40026	Push Knob		1	3-E
24	PU52482	VR Knob		5	5-G
25	PU42558	LA Label		1	2-B
26	PU53146-3	Caution Label		1	5-D
27	PU53146	"		2	2-E, 4-A
28	PU51306	Sticker		1	2-D
29	PU53276	Plastic Rivet		2	2-A
30	PGD40108	Caution Label		1	1-B
31	PGD40109	"		1	2-B

— Front panel assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PGD10009B	Front Panel Ass'y	Incl. ② – ⑯	1	5-C
2	PGD40021-2	Operation Knob (A)		1	3-C
3	" -3	" (A)		1	2-C
4	" -4	" (A)		1	2-C
5	PGD40022	" (B)		8	3-C
6	" -2	" (B)		1	2-C
7	" -3	" (B)		2	3-C
8	" -4	" (B)		1	3-C
9	PGD30004-3	Spring		18	2-C, 3-B
10	PGD30108	Knob Plate (A)		1	3-A
11	PGD30109	" (B)		1	2-B
12	SBSF2605Z	Tapping Screw		8	2-A, 3-A
13	—	—		—	—
14	—	—		—	—
15	—	Search VR Board	See Sec. 6.2.18	1	3-D
16	—	Operation Board	See Sec. 6.2.9	1	2-A
17	SBSF2606Z	Screw		8	1-A, 1-B
18	PU49485	Wire Clamp		1	2-A
19	—	Warning & NR Board	See Sec. 6.2.22	1	4-A
20	SBSF2606Z	Screw		1	4-A

5.2.4 Chassis assembly

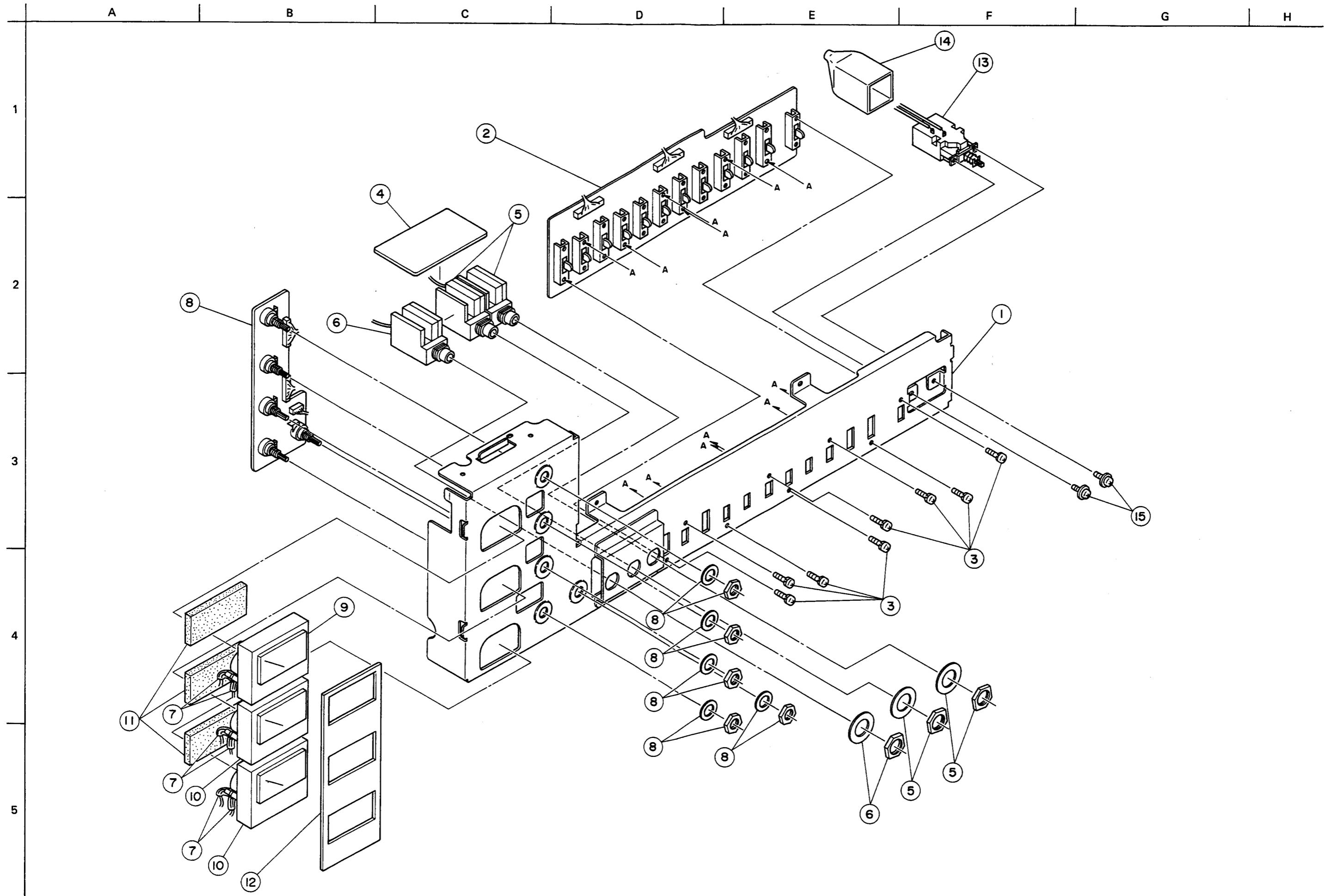


— Chassis assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	—	Main Deck Ass'y		1	4-D
2	PGD10015A	Front Bracket Ass'y		1	4-F
△ 3	PU49881	Edge Cover	Incl. ③	3	4-E, -F
4	SBST3006Z	Tapping Screw		5	4-F, -G, 5-F
5	PGD30110	Mounting Bracket (2)		1	3-G
6	SBST3006Z	Tapping Screw		3	3-G
7	—	Counter Circuit Board Ass'y	See Sec. 5.2.12	1	4-G
8	DPSP3008Z	Screw		4	4-G-H
9	—	Mounting Bracket Ass'y	See Sec. 5.2.5	1	5-G
10	SBST3006Z	Tapping Screw		8	4-F, -G, 5-F, -G
11	PU33027A-5	Power P.W.B. Stay Ass'y	Incl. ⑫	1	4-F
12	PU47876	P.W.B. Holder		2	3-F
13	SBST3006Z	Tapping Screw		2	3-E, 4-G
14	PGD30115A	Center Bracket (B) Ass'y		1	3-D
15	SBST3006Z	Tapping Screw		1	3-E
16	PGD20017A	L. Lower Stay Ass'y	Incl. ⑯, ⑰	1	4-C
17	PU47876	P.W.B. Holder		6	5-B, -C
△ 18	PU49881	Edge Cover		1	4-C
19	SBST3006Z	Tapping Screw		3	5-B, -F
20	—	Rear Frame Ass'y	See Sec. 5.2.6	1	1-C
21	SBST3006Z	Tapping Screw		11	1-C-D-F, 2-C-G, 3-B
22	—	Mother Circuit Board Ass'y	See Sec. 6.2.17	1	3-C
23	SBST3006Z	Tapping Screw		4	3-C, -D
24	PU21514B	L. Upper Stay Ass'y	Incl. ⑮, ⑯	1	4-C
△ 25	PU49485	Wire Clamp		1	3-B
26	SBST3006Z	Tapping Screw		1	3-B
27	“	“		2	4-C, -E
28	PU21586A-4	R. Upper Stay Ass'y	Incl. ⑯, ⑰	1	2-G
△ 29	PU49485	Wire Clamp		1	2-G
30	SBST3006Z	Tapping Screw		1	2-G
31	“	“		2	2-G, 3-G
32	PU21509B	Center Upper Stay Ass'y	Incl. ⑯, ⑰, ⑲	1	4-F
33	PU49485	Wire Clamp		2	3-E, -F
34	SBST3006Z	Tapping Screw		4	2-E, 3-E
35	—	Video Erase Circuit Board Ass'y	See Sec. 6.2.26	1	3-A
36	GBST3008Z	Tapping Screw		2	4-A
37	PU21590A-4	R. Lower Stay Ass'y	Incl. ⑳	1	2-G
△ 38	PU48086	Edge Cover		1	2-F
39	SBST3006Z	Tapping Screw		2	2-G, 2-H
△ 40	PGZ00014	Power Transformer		1	2-F
41	SBST3008Z	Tapping Screw		4	1-G, 2-E, -G
42	—	P.B. Color Circuit Board Ass'y	See Sec. 6.2.3	1	3-B
△ 43	PU49485	Wire Clamp		2	5-G
△ 44	QZF2115-002	Foot		4	2-C, -D, 5-E, -F
45	SBST3010Z	Tapping Screw		4	2-C, -D, 5-E, -F
46	—	Cassette Housing Ass'y	See Sec. 5.2.11	1	2-D
47	DPSP3008Z	Screw		4	2-D, -E
48	—	Regulator Circuit Board Ass'y	See Sec. 6.2.7	1	3-F
49	GBST3008Z	Tapping Screw		2	3-F, -G
50	—	Syscon Circuit Board Ass'y	See Sec. 6.2.8	1	5-D
51	SBST3008Z	Tapping Screw		2	5-E
52	—	PRE/REC Circuit Board Ass'y	See Sec. 6.2.5	1	3-C
53	PU33706B	PRE/REC Shield Ass'y		1	2-C
54	—	Drum Servo Circuit Board Ass'y	See Sec. 6.2.16	1	2-B
55	—	Capstan Servo Circuit Board Ass'y	See Sec. 6.2.15	1	2-B

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
56	—	Reel Servo Circuit Board Ass'y	See Sec. 6.2.14	1	2-A
57	SBST3006Z	Tapping Screw		15	1-AC, 2-CD, 3-BC
58	—	REC Y & Color Circuit Board Ass'y	See Sec. 6.2.4	1	5-D
59	GBST3008Z	Tapping Screw		2	4-C, -D
60	PGD40100	Stay		1	3-F
61	—	P.B. Y Circuit Board Ass'y	See Sec. 6.2.2	1	4-C
62	PGD30117A	P.B. Y Shield Ass'y		1	4-B
63	GBST3008Z	Tapping Screw		2	4-B
64	—	Audio Circuit Board Ass'y	See Sec. 6.2.1	1	4-B
65	GBST3008Z	Tapping Screw		2	4-A, -B
66	PGD40093	Shield Board	for REC Y & Color	1	4-B
67	GBST3006Z	Tapping Screw		2	4-B
△ 68	QMF51C3-5R0	Fuse	5.0 A, 125 V (F002)	1	2-G
△ 69	" -4R0	"	4.0 A, 125 V (F003)	1	3-G
△ 70	" -R40	"	400 mA, 250 V (F004)	1	3-G
△ 71	" -1R25	"	1.25 A, 125 V (F005)	1	3-G
△ 72	" -1R25	"	" " (F006)	1	2-G
△ 73	" -1R0	"	1.0 A, 250 V (F007)	1	3-G
△ 74	" -R80	"	800 mA, " (F008)	1	3-G
△ 75	" -2R5	"	2.5 A, 125 V (F009)	1	3-G
△ 76	" -2R0	"	2.0 A, 125 V (F010)	1	2-G
△ 77	" -3R15	"	3.15 A, 125 V (F011)	1	3-G
78	PGD30156	Shield Plate	for Regulator	1	3-G
79	—	Display Circuit Board Ass'y	See Sec. 6.2.21	1	4-H
△ 80	PGD40058	Heat Sink		1	1-F
△ 81	STK5730	Power Transistor		1	1-E
82	SDSP3012Z	Screw		2	1-E
83	—	Power Transistor Board		1	1-F
84	SDSP3006Z	Screw		2	2-F
85	LPSP3006Z	"	See Sec. 6.2.25	2	1-F

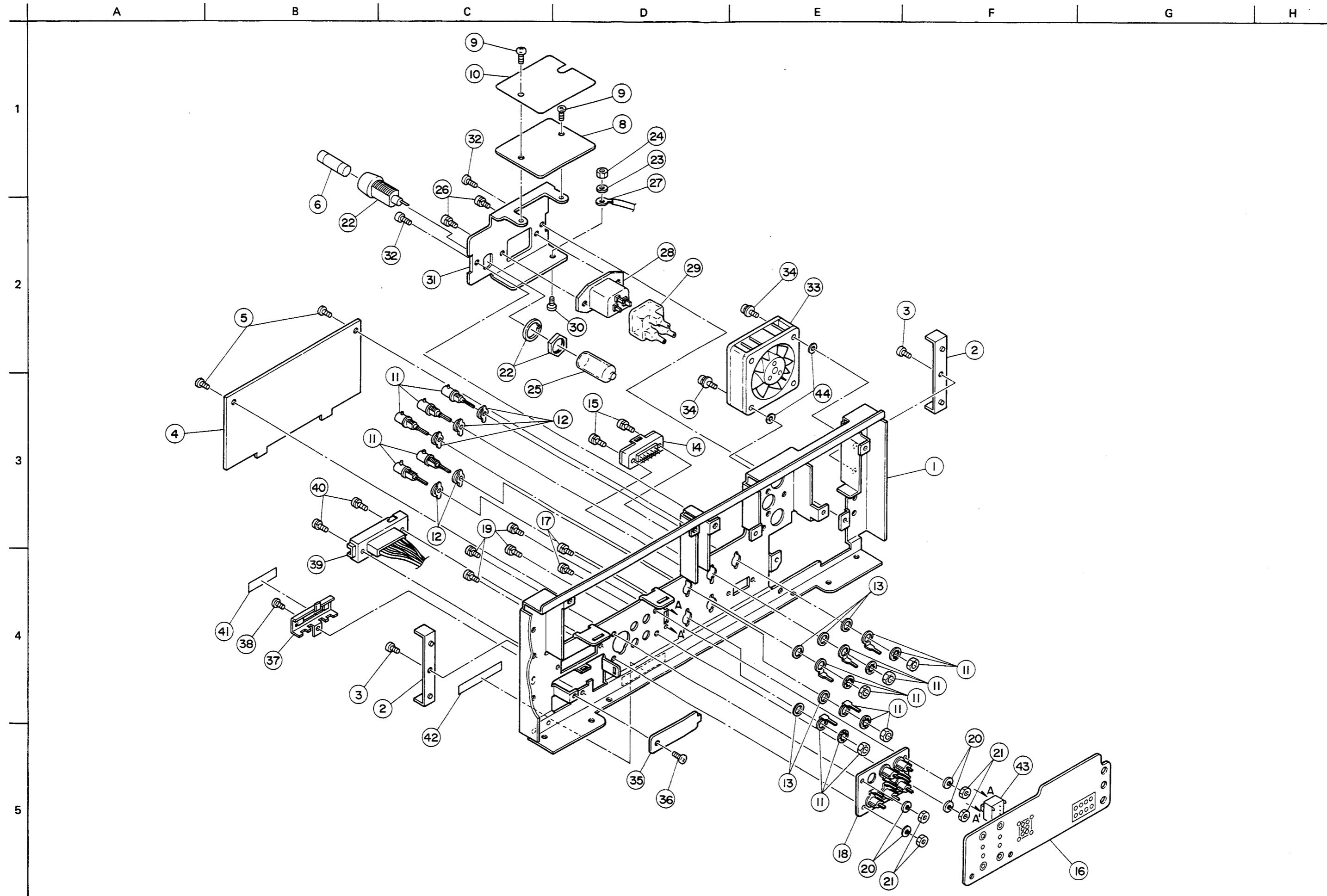
5.2.5 Mounting bracket assembly



— Mounting bracket assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PGD10006	Mounting Bracket (1)		1	2-F
2	—	Switch Board		1	1-C
3	LPSP2604Z	Screw		8	4-E, -F
4	PGE40005	Jack Board		1	1-C
5	PU51574	Mic Jack		2	2-C, 5-F
6	PU51575	Head Phone Jack		1	2-B, 5-E
7	QXT358H-020	Tube		6	4-A, 5-A
8	—	VR Board		1	2-A,4-D,5-D,-E
9	PU53866-4	Meter		1	4-B
10	" -1-3	"		2	5-A, -B
11	PGD40056	Cushion		3	4-A
12	PGD40057	Meter Sheet		1	5-B
△13	QSP1110-222	Push Switch		1	1-F
△14	PU49885	Switch Cover		1	1-F
15	DPSP3006Z	Screw	POWER	2	3-G

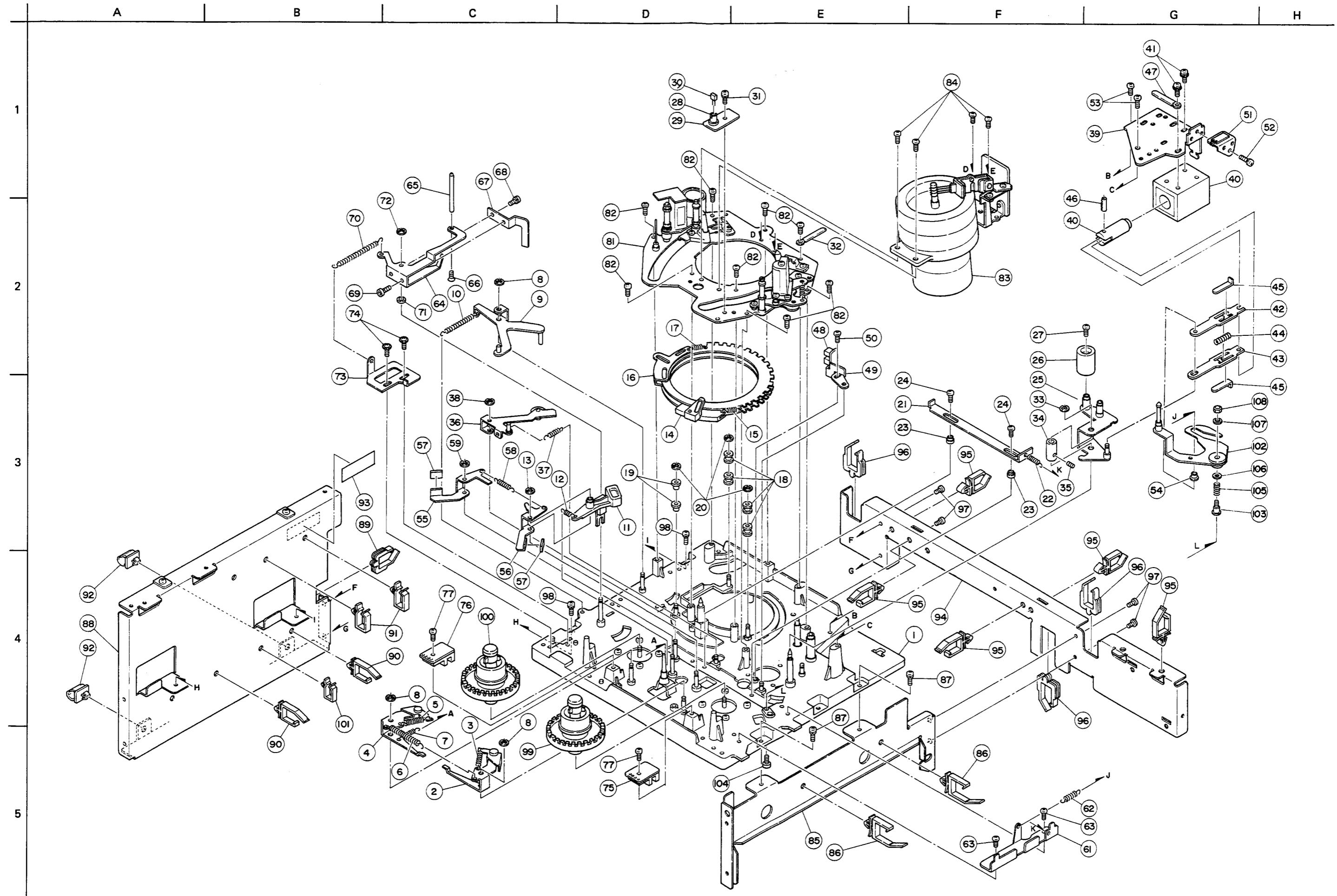
5.2.6 Rear frame assembly



— Rear frame assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PGD10011	Rear Bracket		1	3-F
2	PU51406	Rear Stay		2	2-F, 4-C
3	SBST3006Z	Tapping Screw		2	2-F, 4-B
4	—	Junction Circuit Board Ass'y	See Sec. 6.2.10	1	3-A
5	GBST3008Z	Tapping Screw		2	2-B
▲ 6	QMF51U1-2R5	Fuse	2.5 A, 125 V (F001)	1	2-B
7	—	—	—	—	—
8	—	Line Filter Circuit Board Ass'y	See Sec. 6.2.27	1	1-D
9	GBST3008Z	Tapping Screw		2	1-C, -D
▲ 10	PU51853	Insulator Cover		1	1-C
11	PU51213	BNC Connector		5	3-B,-C,4-F,5-E
12	PU48611	Rign		5	3-C, -D
13	Q03093-439	Washer		5	4-E, 5-E
14	PU51214	Connector	8 Pin	1	3-D
15	LPSP2310Z	Screw		2	3-D
16	—	Rear Circuit Board	See Sec. 6.2.11	1	5-G
17	LPSP2604Z	Screw		2	3-C
18	PU50608	Jack Ass'y		1	5-E
19	LPSP3008Z	Screw		4	3-C
20	WLS3000N	Lock Washer		4	5-E, -F
21	NNS3000Z	Nut		4	5-E, -F
▲ 22	QMG0301-003	Fuse Holder		1	2-B, 2-C
▲ 23	WLS4000N	Lock Washer		1	1-D
▲ 24	NNB4000N	Nut		1	1-D
▲ 25	PU50316	Fuse Cover		1	3-C
26	LPSP3008Z	Screw		2	1-C
▲ 27	A50221-2	Earth Lug		1	1-D
▲ 28	QMC0335-003	AC Connector		1	2-D
▲ 29	PU52931	Connector Cover		1	2-D
▲ 30	SDBP4008N	Screw		1	2-D
▲ 31	PGD30119	Power Bracket		1	2-C
32	LPSP3006Z	Tapping Screw		2	1-C, 2-C
▲ 33	PGZ00028	Fan Motor		1	2-E
34	DPSP3028Z	Screw		2	2-E, 3-D
35	—	Hour Meter Circuit Board	See Sec. 6.2.24	1	5-D
36	SBST3006Z	Tapping Screw		2	5-D
37	PGD40031	Lens Holder		1	4-B
38	SBST3006Z	Tapping Screw		1	4-B
39	PU44246-5	Connector	45 Pin	1	4-B
40	LPSP2610Z	Screw		2	3-B
41	PU52764-2	Lens		1	4-B
42	PU51306	Sticker		1	5-C
43	QSS2201-002	Slide Switch		1	5-F
44	PGD40106	Spacer	Fuse Caution	2	3-E

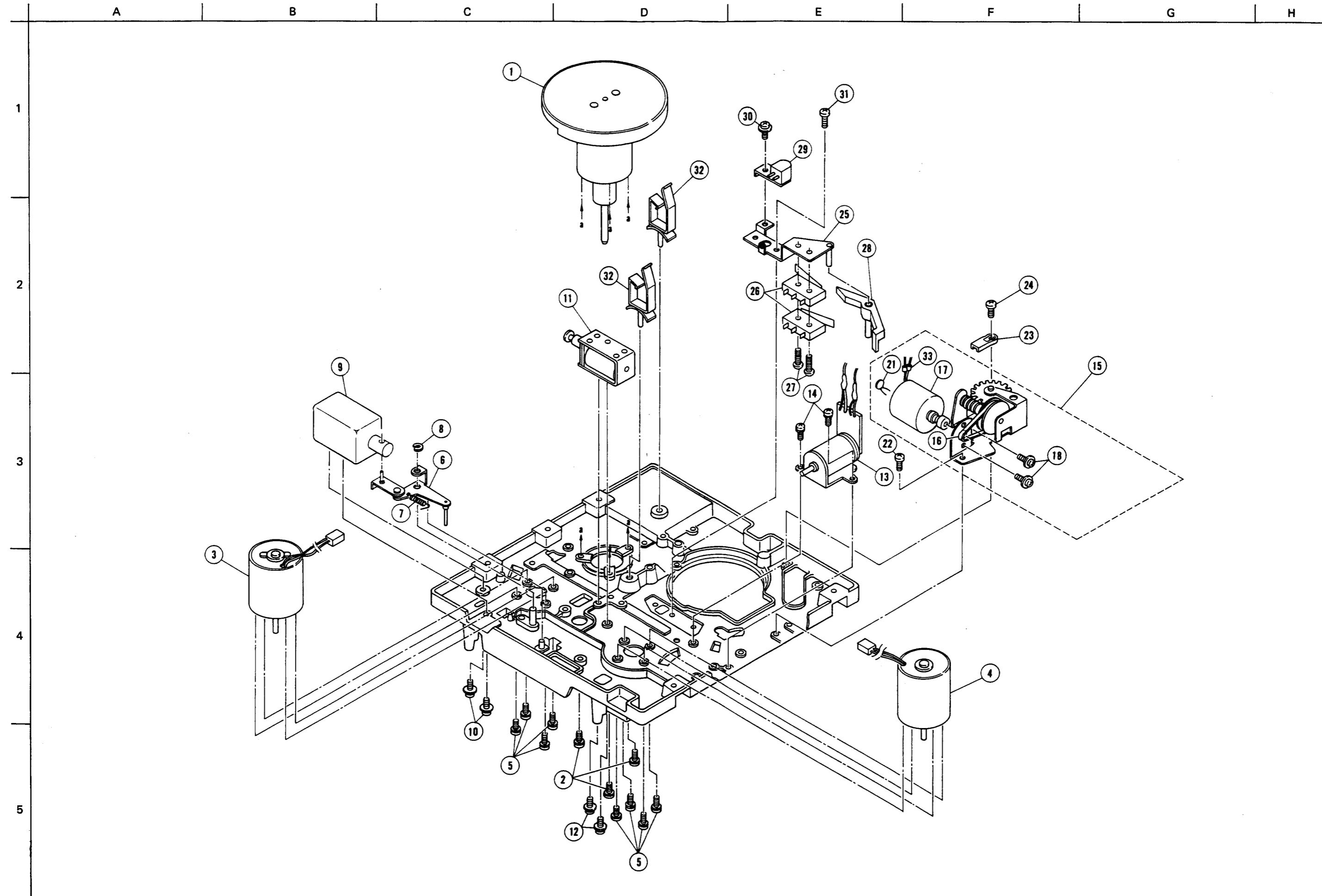
5.2.7 Main-deck (1) assembly



- Main-deck (1) assembly list -

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position	Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PU21159B	Main Deck Ass'y	Incl. ③	1	4-F	56	PRD40011A	Brake Arm (2) Ass'y	Incl. ⑤7	1	4-C
2	PU50535B	T.U Brake Ass'y		1	5-C	57	PRD40010	Pad		2	3-C, 4-C
3	PQM30001-47	Spring		1	4-C	58	PQM30001-104	Spring		1	3-C
4	PU50535A	S. Brake Ass'y	Incl. ⑤ - ⑦	1	5-B	59	REE3000	E Washer		1	3-C
5	PQM30001-47	Spring		1	4-C	60	-	-		-	-
6	" -46	"		1	5-C	61	PRD40022A-1	C. Holder Ass'y	Incl. ⑥2	1	5-G
7	" -7	"		1	5-C	62	PQM30001-44	Spring		1	5-G
8	REE3000	E Washer		2	2-C, 4-C	63	SBST3008Z	Tapping Screw		2	5-F, -G
9	PU50545A	Cancel Lever Ass'y	Incl. ⑩	1	2-C	64	PU50581	Tension Arm		1	2-C
10	PUM30001-48	Spring		1	2-C	65	PU44852-2	Tension Pole		1	1-C
11	PU50547A	B. Tension Lever Ass'y	Incl. ⑫	1	3-D	66	SSSP2605Z	Screw		1	2-C
12	PQM30001-6	Spring		1	3-D	67	PU50582	Lever		1	1-C
13	REE3000	E Washer		1	3-C	68	LPSP3006Z	Screw		1	1-C
14	PU48838B	T.U. Drive Ring Ass'y	Incl. ⑯	1	3-D	69	BYS3006FS	Set Screw		1	2-B
15	PU35005-81	Spring		1	3-E	70	PQM30001-49	Spring		1	2-B
16	PU48837B	S. Drive Ring Ass'y	Incl. ⑯	1	3-D	71	Q03093-830	Washer		1	2-C
17	PU35005-81	Spring		1	2-D	72	REE1500	E Washer		1	2-C
18	PU48711	Pulley		4	3-E	73	PRD40004	Adjust Lever		1	3-B
19	PU50758	"		2	3-D	74	GBST3008Z	Tapping Screw		2	2-B
20	REE3000	E Washer		3	3-D	75	PU55701	T.U. Photo Interrupt Ass'y		1	5-D
21	PRD40002A	Slide Bar Ass'y	Incl. ⑯	1	3-E	76	"	S. Photo Interrupt Ass'y		1	4-C
22	PGD30003-2	Spring		1	3-F	77	SBST3008Z	Tapping Screw		2	4-C, 5-D
23	PQM30013	Frang Collar		2	3-E, -F	78	-	-		-	-
24	SDST3006Z	Tapping Screw		2	3-E, -F	79	-	-		-	-
25	PRD40042A-1	Pinch Roller Arm Ass'y	Incl. ⑯, ⑯	1	3-F	80	-	-		-	-
26	PQ40137A	Pinch Roller Ass'y		1	2-F	81	-	Sub Deck Ass'y	See Sec. 5.2.9	1	2-D
27	LPSP2604Z	Screw		1	2-F	82	SBST3006Z	Tapping Screw		8	1-D, 2-D, -E
28	PQ30101A	L.E.D. Holder		1	1-D	83	-	Drum Ass'y	See Sec. 5.2.10	1	2-F
29	PU55110	L.E.D. Board		1	1-D	84	LPSP3010Z	Screw		4	1-F
30	GL-450	L.E.D.		1	1-D	85	PGD20014A	Center Lower Stay Ass'y		1	5-E
31	LPSP3006Z	Screw		1	1-E	△86	PU54969	Wire Clamp		2	5-E, -F
32	PU49485-4	Wire Clamp		1	2-E	87	LPSP3008Z	Screw		2	4-E, -F
33	REE2500	E Washer		1	3-F	88	PGD20015A	L. Side Bracket Ass'y	Incl. ⑯9 - ⑯9, ⑯01	1	4-A
34	PRD40037	Stop Ring		1	3-F	△89	PU49881	Edge Cover		1	3-B
35	YFS3003S	Set Screw		1	3-F	△90	PU54969-2	Wire Clamp		2	4-C, 5-B
36	PRD40005A	F.R. Arm Ass'y	Incl. ⑯	1	3-C	91	PU48016	Mini Clamp		2	4-C
37	PQM30001-15	Spring		1	3-C	92	PU47876	P.W.B. Holder		2	4-A
38	REE3000	E Washer		1	3-C	93	PU42091	No. Plate		1	3-B
39	PU32857	Solenoid Bracket		1	1-G	94	PGD20016A	Center Bracket (A) Ass'y	Incl. ⑯95, ⑯96	1	4-F
△40	PGZ00093	Solenoid	PINCH ROLLER	1	1-G, 2-F	95	PU54969-2	Wire Clamp		5	3-F, -G, 4-F, -G
41	DPSP3005Z	Screw		2	1-G	△96	PU49881	Edge Cover		3	3-E, 4-G
42	PU50564	Solenoid Lever(1)		1	2-H	97	SBST3006Z	Tapping Screw		4	3-F, 4-G
43	PU50565	" (2)		1	2-H	98	LPSP3008Z	Screw		2	3-D, 4-C
44	PQM30002-8	Spring		1	2-H	99	PGZ00094	T.U. Reel Disk Ass'y		1	5-C
45	PU47327	Spacer		2	3-H	100	PGZ00095	S. Reel Disk Ass'y		1	4-C
46	PRE3008	Spring Pin		1	2-H	101	PU48016-2	Mini Clamp		1	4-B
47	PU49485-3	Wire Clamp		1	1-G	102	PGD40113A-1	Tape Guide Arm Ass'y		1	3-H
48	-	Pick Out Det. Board	See Sec. 6.2.23	1	2-E	103	PGD40115	Stud		1	3-H
49	PRD40007	Bracket		1	2-E	104	LPSP2608Z	Screw		1	5-D
50	SBST3006Z	Tapping Screw		1	2-E	105	PU30080-69	Spring		1	3-H
51	PU50570	DEW Sensor		1	1-G	106	Q03093-502	Washer		1	3-H
52	LPSP3006Z	Screw		1	1-H	107	" -82	"		1	3-H
53	SBST3006Z	Tapping Screw		2	1-G	108	PU49276	Nylon Nut		1	3-H
54	PGD40114	Guide Roller		1	3-G						
55	PRD40008A	Brake Arm (1) Ass'y	Incl. ⑯, ⑯	1	3-C						

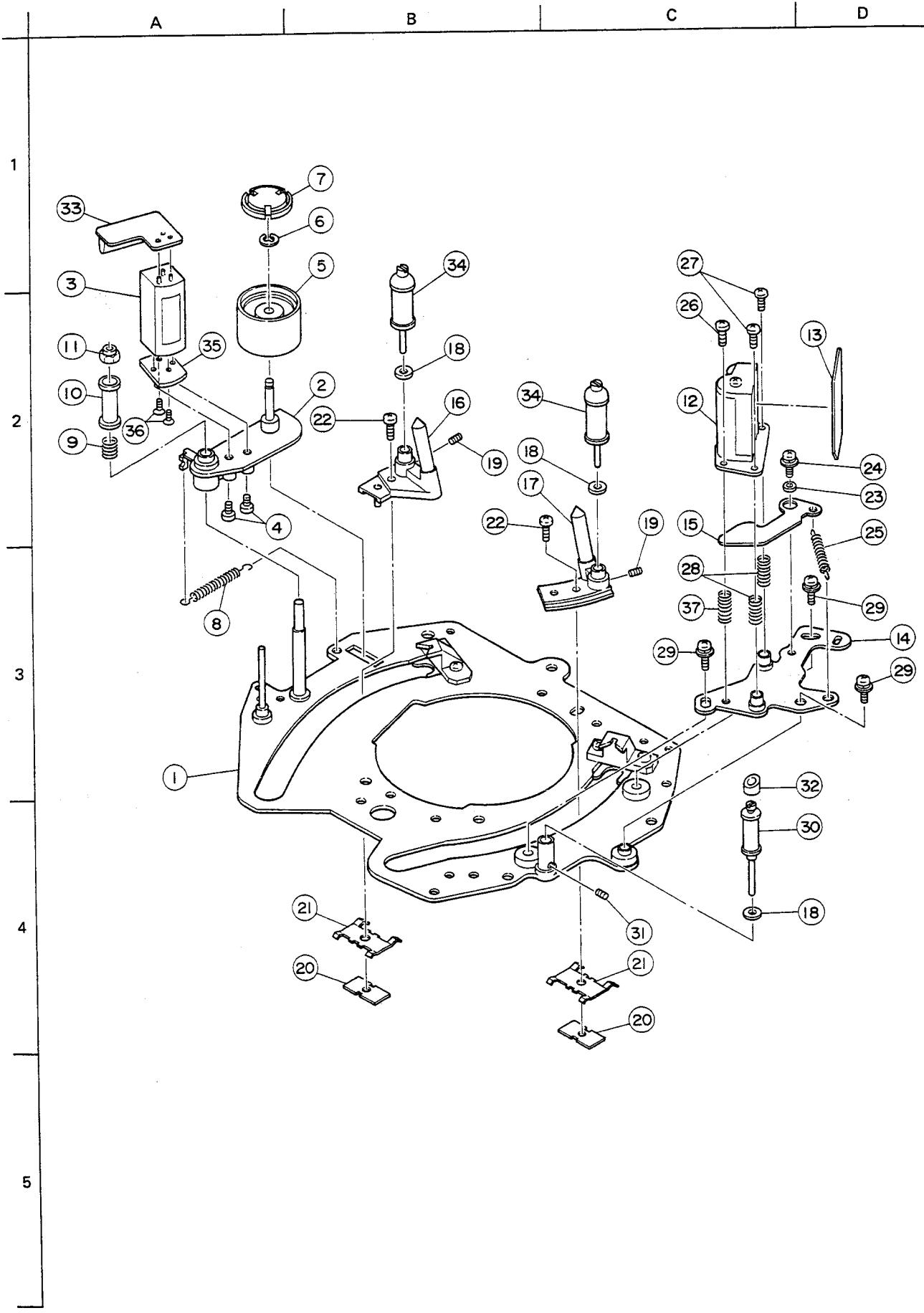
5.2.8 Main-seck (2) assembly



— Main-deck (2) assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
△ 1	PGZ00026	Capstan Motor		1	1-C
2	LPSP3008Z	Screw		3	5-D
△ 3	PU50531	T.U Reel Motor		1	4-B
△ 4	PU50531-2	S. Reel Motor		1	4-F
5	LPSP3006Z	Screw		8	5-C, D
6	PU50538A	Connect Lever Ass'y	Incl. (7)	1	3-C
7	PUM30001-6	Spring		1	3-C
8	REE3000	E Washer		1	3-C
△ 9	PGZ00092	Solenoid		1	2-B
10	DPSP3008Z	Screw		2	5-C
△ 11	PGZ00091	Solenoid	BACK TENSION	1	2-D
12	DPSP2608Z	Screw		2	5-D
13	PGZ00031	Differential Transformer Ass'y		1	3-E
14	SBST3006Z	Tapping Screw		2	3-E
15	PGZ00032A	Loading Drive Gear Ass'y	Incl. (16) - (21), (23)	1	2-G
16	PU50350	Belt		1	3-F
△ 17	PU52745A	Loading Motor Ass'y		1	2-F
18	LPSP2604Z	Screw		2	3-F
19	—	—		—	—
20	—	—		—	—
△ 21	QCF11HP-473	C Cap		1	2-E
22	SBST3006Z	Tapping Screw		1	3-E
23	PU43981	Holder		1	2-F
24	SBST3008Z	Tapping Screw		1	2-F
25	PU48952A	Switch Bracket Ass'y	Incl. (26) - (28)	1	2-E
26	QSM1S11-201	Micro Switch		2	2-E
27	SPBP2316N	Screw		2	3-E
28	PU48955	Switch Lever		1	2-E
29	PU54172	Pick UP Head Ass'y		1	1-E
30	DPSP3006Z	Screw		1	1-E
31	SBST3006Z	Tapping Screw		1	1-E
32	PU54969-2	Wire Clamp		2	1-D, 2-D
△ 33	PU45811	Ferrite Beads		2	2-F

5.2.9 Sub deck assembly



— Sub deck assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PUS46309B	Sub-deck Sub Ass'y		1	3-A
2	PU49555A	Erase Head Arm Sub Ass'y		1	2-B
3	PU54397	Full Erase Head		1	1-A
4	LPSP2003Z	Screw		2	2-A
5	PU51203A	Roller Ass'y		1	1-B
6	REE1500	E Washer		1	1-B
7	PU51204	Thrust Cap		1	1-B
8	PQM30001-13	Spring		1	3-A
9	PU30080-69	"		1	2-A
10	PU48733	Guide Pole		1	2-A
11	PU49276	Nylon Nut		1	2-A
12	PGZ00025	A/C Head Ass'y		1	2-C
13	PGE40009	A/C Head Board		1	2-D
14	PRD40019A	Head Base Sub Ass'y		1	3-D
15	PRD40021	Guide Plate		1	2-C
16	PQ40171A	S. Pole Base Ass'y		1	2-B
17	PQ40172A	T.U. Pole Base Ass'y		1	2-B
18	PU48806-3	Rubber Tire		3	2-B, 4-D
19	YFS3002.5S	Set Screw		2	2-B, 2-C
20	PU51638	Plate		2	4-B, 4-C
21	PU51299	Spring Plate		2	4-B, 4-C
22	SPSP2606Z	Screw		2	2-B
23	PQM30005-12	Colter		1	2-D
24	DPSP3006Z	Screw		1	2-D
25	PQM30001-19	Spring		1	2-D
26	SPSP2610Z	Screw		1	2-C
27	SPSP2608Z	"		2	1-C
28	PU30080-49	Spring		3	3-C
29	DPSP3006Z	Screw		3	3-C, 3-D
30	PRD40027A	Guide Roller Ass'y		1	4-D
31	YFS3002.5S	Set Screw		1	4-C
32	PRD40030	Cap		1	3-D
33	—	Full Erase Head Board		1	1-A
34	PU48748B	Guide Roller Ass'y		2	1-B, 2-B
35	PRD40024	Plate		1	2-A
36	SSSP2003Z	Screw		2	2-A
37	PGD30004-5	Spring		1	3-C

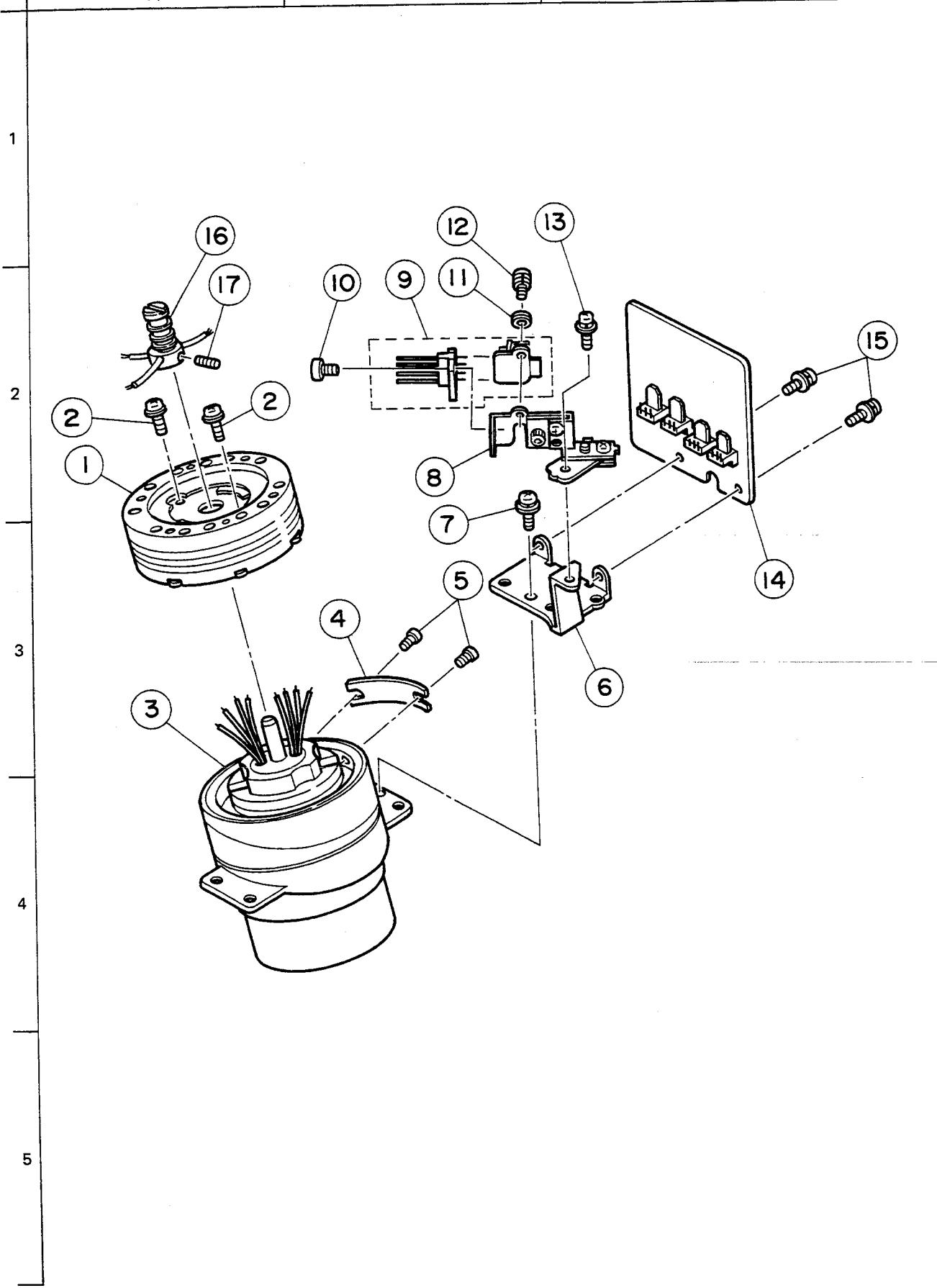
5.2.10 Drum assembly

A

B

C

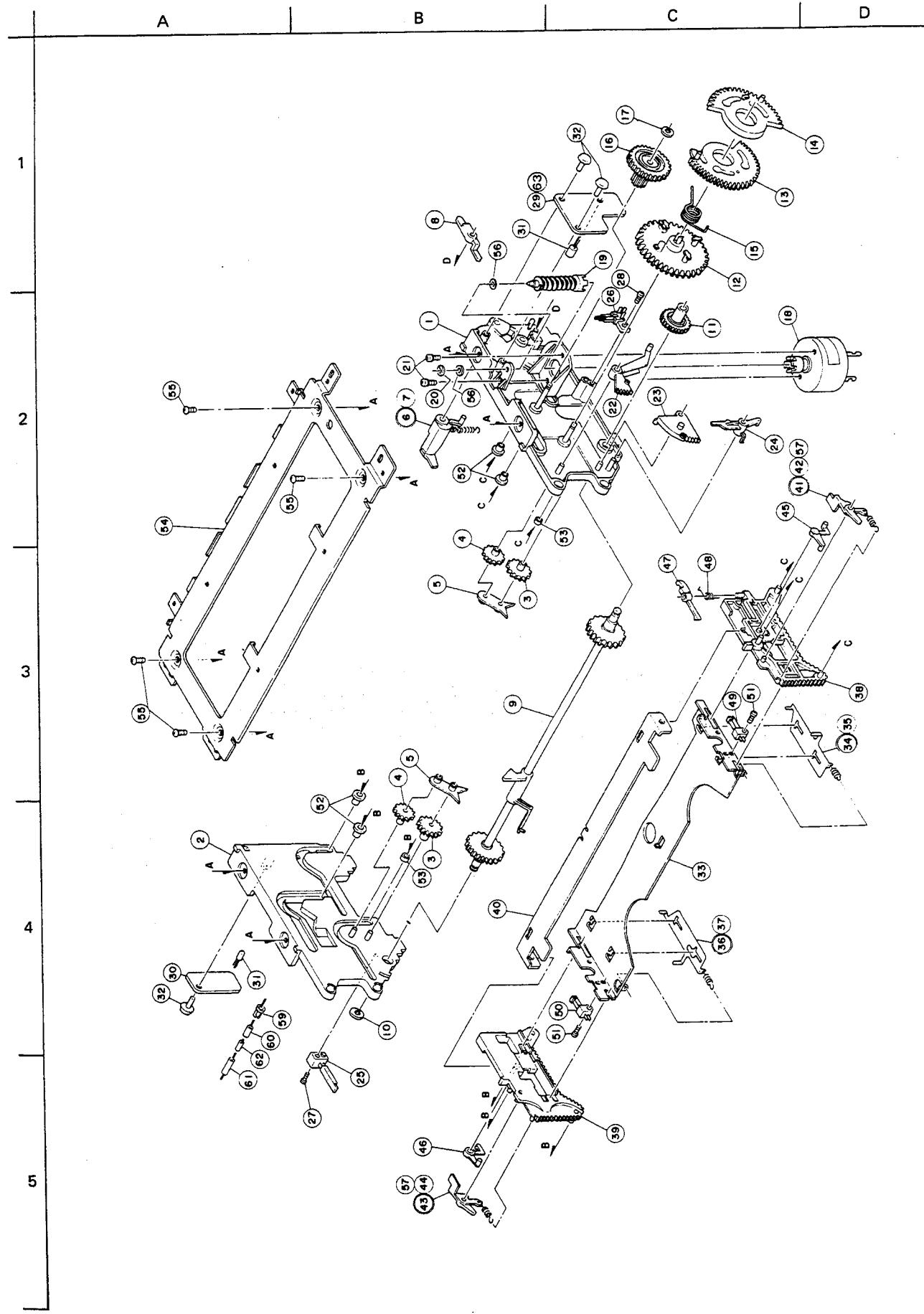
D



— Drum assembly list —

Symbol No.	Part No.	Part Name	Description	O'ty	Symbol No.. Position
1	PGD20018B	Upper Drum Ass'y	Incl. (2)	1	2-A
2	NDBP3010N	Screw		2	2-A
△ 3	PUS26687B-4	Lower Drum Ass'y	Incl. (4), (5)	1	3-A
4	PU48700-4	Heater Ass'y	of PU48700-5	1	3-B
5	SDBP3004N	Screw		2	3-B
6	PU50595	Bracket		1	3-C
7	DPSP3006Z	Screw		1	3-B
8	PGD30116A	Brush Ass'y	Incl. (9) – (13)	1	2-B
9	PUS46507A	Brush Sub Ass'y		1	2-B
10	SPSP2006Z	Screw		1	2-B
11	WBS2000Z	Washer		1	2-B
12	LPSP2006Z	Screw		1	1-B
13	DPSP3006Z	"		1	1-C
14	–	V. Head Circuit Board Ass'y	See Sec. 6.2.13	1	3-C
15	DPSP3006Z	Screw		2	2-D
16	PGZ00021-1-1	Slip Ring Ass'y		1	1-A
17	YFS3003B	Set Screw		1	2-A

5.2.11 Cassette housing assembly



— Cassette housing assembly list —

Symbol No.	Part No.	Part Name	Description	Q'ty	Symbol No. Position
1	PQ30033C	R. Guide Stay Assembly		1	2-B
2	PQ10008	L. Guide Stay		1	4-A
3	PQ40059	Gear (1)		2	3-B, 4-B
4	PQ40060	" (2)		2	3-B
5	PQ40061	Double Cap		2	3-B
6	PQ40102A	Door Guide Assembly	Incl. (7)	1	2-B
7	PUM30001-111	Spring		1	2-B
8	PQ40063	Guide Lever		1	1-B
9	PQ40103A	Connect Gear Assembly		1	3-B
10	PUM30017-11	Slit Washer		1	4-B
11	PQ40065	Cam Gear (2)		1	2-C
12	PQ30028	" (1)		1	2-C
13	PQ40066	L. Slide Gear		1	1-C
14	PQ40067	UL. Slide Gear		1	1-D
15	PQ40068-2	Limiter Spring		1	1-C
16	PQ40484	Worm Wheel		1	1-C
17	PUM30017-4	Slit Washer		1	1-C
18	PQ40090A	Motor Assembly		1	2-C
19	PQ40091B	Worm Assembly		1	1-C
20	PUM30017	Slit Washer		1	2-B
21	LPSP2605Z	Screw		2	2-B
22	PQ40074	U. Door Opener		1	2-C
23	PQ40075-1-5	L. Door Opener		1	2-C
24	PQ40076-1-5	Hold Lever		1	2-C
25	PU51259-3	Leaf Switch		1	5-B
26	PU55377	End Switch	HOUSING UP/DOWN DET	1	2-C
27	SPSP2010Z	Screw		1	5-B
28	SBSE2610Z	"		1	2-C
29	PGE40002	Cassette Housing Board		1	1-B-C
30	PGE40019	End Sensor Board	1 8 1 3	1	4-A
31	PT-352VA	Photo Transistor	or PN202SR	2	1-B, 4-A
32	PU48973-3	Stopper		3	1-C, 4-A
33	PQ30031-1-2	Cassette Holder		1	4-C
34	PQ40106B-1	R. Slide Plate Assembly	Incl. (35)	1	3-D
35	PUM30001-113	Spring		1	3-D
36	PQ40107B-1	L. Slide Plate Assembly	Incl. (37)	1	4-C
37	PUM30001-113	Spring		1	4-C
38	PQ10009-1-3	R. Bracket		1	3-D
39	PQ10009-2-3	L. Bracket		1	5-C
40	PQ30032-1-3	Reinforcement		1	4-B
41	PQ40108B	R. Lock Lever Assembly	Incl. (42) and (57)	1	2-C-D
42	PUM30001-110	Spring		1	2-C-D
43	PQ40109B	L. Lock Lever Assembly	Incl. (44) and (57)	1	5-B
44	PUM30001-110	Spring		1	5-B
45	PQ40081A	R. Switch Lever Assembly		1	2-C
46	PQ40081B	L. Switch Lever Assembly		1	5-B
47	PQ40083	Lid Opener		1	3-C
48	PQ40084-1-2	Spring		1	3-C
49	PU55378	R. Insert Switch	CASS IN DET	1	3-C
50	PU55378-2	L. Insert Switch	"	1	4-C
51	SPSP1704Z	Screw		2	3-C, 4-C, 5-C
52	PQ40086	Roller		4	2-B, 4-B
53	PQ40087-2	Mini Roller		2	3-C, 4-B
54	PQ20003	Roof Plate		1	2-A
55	SBSE2608Z	Screw		4	2-A-B, 3-A
56	Q03093-838	Spacer		2	1-B, 2-B
57	PUM30019-10	Pad		2	2-C-D, 5-B
58	—	—		—	
59	PQ40299	Wire Cap		1	4-A
△ 60	QXT629H-020	UL Tube		1	4-A, 5-A
△ 61	QXT329H-035	"		1	5-A
△ 62	QXTF253-020	"		1	5-A
63	PU43351-110	Cap Housing		1	1-B
64	PUS26805G	Cassette Housing Ass'y	Incl. (1) - (63)	—	

SECTION 6

ELECTRICAL PARTS LIST

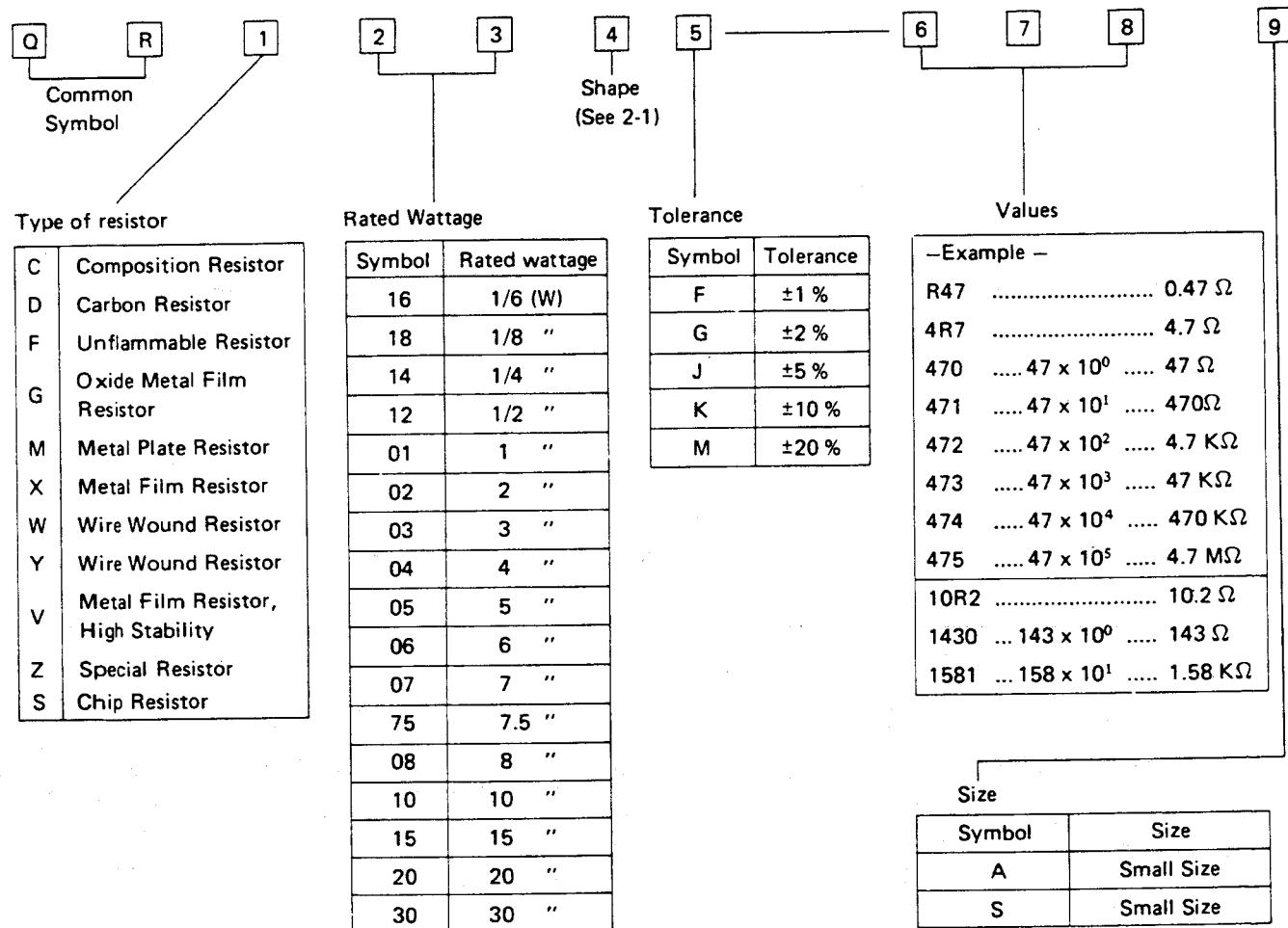
SAFETY PRECAUTION

Parts identified by the  symbol are critical for safety. Replace only with specified part numbers.

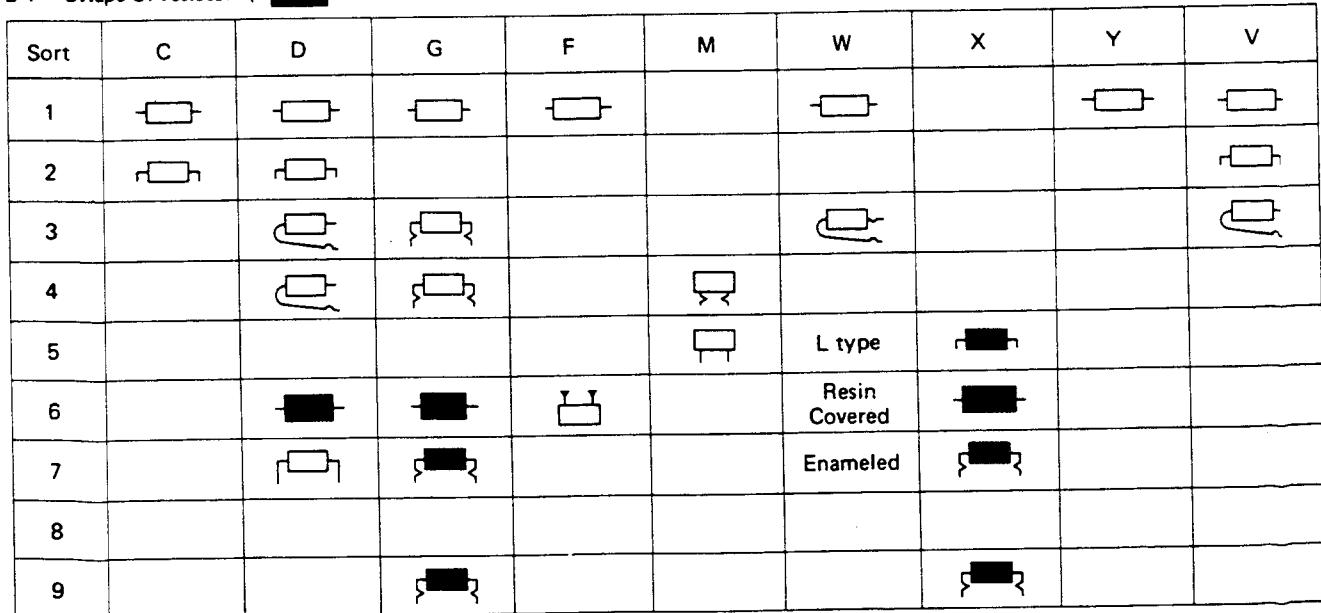
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6.1 STANDARD PART NUMBER CODING

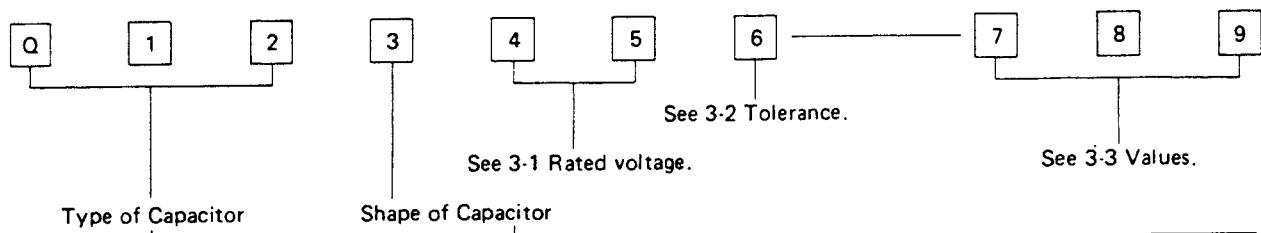
6.1.1 Fixed Resistor Coding



2-1 Shape of resistor (: Flame retardant resistor)



6.1.2 Fixed Capacitor Coding



Ceramic Capacitors

Symbol	Type of Capacitor	Disk Lead	Kink Lead			
QCC	Ceramic			4	5	
QCF	"	1	3			
QCS	"	1	3			
QCT	Temperature compensation					
QCX	Special			1	3	
QCY	Ceramic	1, 4	3			8
QCZ	Special					

Electrolytic Capacitors

Symbol	Type of Capacitor	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEA	Characteristic A	2	4			
QEB	Low Leakage		4	5	6	
QED	Characteristic D	2	4			
QEE	Tantalum		4	5		
QEE	" (small type)		8			
QEK	Characteristic W (subminiature type)		4	5		
QEL	Characteristic L					7
QEN	Non-polar	2	4	5	6	
QET	Characteristic W (small type)	2	4	5	6	
QEWF	Characterisitc W	2	4	5	6	7
QEZF	Special					

Paper Film Capacitors

Symbol	Type of Capacitor	Tubular	Normal		Flame retardant	
			Mono-direction	Kink Lead	Mono-direction	Kink Lead
QFF	Film mica		4			
QFH	Metalized mylar	2	4	3	5	6
QFM	Mylar	2	4	3, 7	5	6
QFN	" (small type)		4			
QFP	Polypropylene		4	3		
QFS	Polystyrole	2	4	3		
QFZ	Special					

3-1 Rated voltage (V)

First letter \ 2nd letter	A	B	C	D	E	F	G	H	J	K	V	W	X
0					3.15			6.3					
1	10		16	20	25		40	50	63		35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

3-2 Tolerance

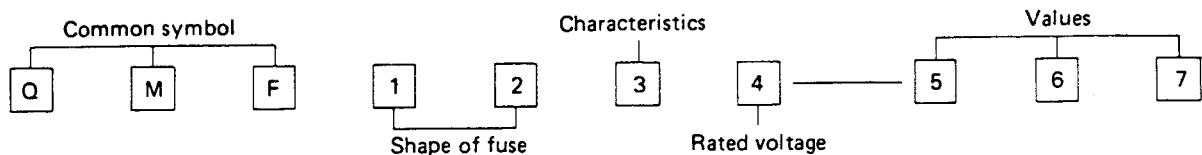
Symbol	F	G	J	K	M	N	Z	P	A	H	R
(%)	± 1	± 2	± 5	± 10	± 20	± 30	$+80$ -20	$+100$ -0	$+100$ -10	$+50$ -10	$+30$ -10

3-3 Values

— Example — Values are in picofarads.

101	....	10×10^1	....	100 pF
102	....	10×10^2$	....	1,000 \text{ pF} = 0.001 \mu\text{F}$
103	....	10×10^3$	....	10,000 \text{ pF} = 0.01 \mu\text{F}$
104	....	10×10^4$	....	100,000 \text{ pF} = 0.1 \mu\text{F}$
5R0	....	5.0	....	5 pF

6.1.3 Fuse Coding



Shape of Fuse (first and second digit)

Symbol No.	Shape	Remarks
51		$\phi 5.2 \times 20$ mm
60		$\phi 6.4 \times 30$ mm
61		$\phi 6.35 \times 31.8$ mm
63		With 60 Lead Wire
66		With 61 Lead Wire

Rated Voltage (fourth digit)

Symbol No.	Rated Voltage	
1	AC 125 V	
2	AC 250 V	
3	100 mA	AC 250 V
	1 A	
3	1.25 A	AC 125 V
	6.3 A	

Value (fifth – seventh digit)

– Example –	
R10	..... 100 mA
R125	..... 125 mA
1R0	..... 1.0 A
1R2	..... 1.2 A
1R25	..... 1.25 A
100	..... 10 A

Characteristics (third digit)

Symbol No.	Fusing Current	Fusing Time	Remarks
S	160%	Within 1 hr.	Anti-rush Type
	200%	" 2 min.	
	700% – 2000%	" 0.01 sec.	
R	160%	" 1 hr.	Regular Fusible Type
	200%	" 2 min.	
M	135%	" 1 hr.	Regular Fusible Type (for UL)
	200%	" 2 min.	
U	135%	" 1 hr.	Anti-rush Type (for UL)
	200%	" 2 min.	
	800% – 2000%	" 0.01 sec.	
A	210%	" 2 min.	Anti-rush Type (for Europe)
	275%	0.5 – 10 sec.	
	400%	0.15 – 2 sec.	
	1000%	0.02 – 0.3 sec.	
B	210%	Within 30 min.	Regular Fusible Type (for SEMKO, Europe)
	275%	0.05 – 2 sec.	
	400%	0.01 – 0.3 sec.	
C	135%	Within 1hr.	Anti-rush Type (for UL, Japan)
	200%	" 2 min.	

6.2.1 Audio Circuit Board Ass'y 0 1 PGE10001A

Symbol No.	Part No.	Part Name	Description
IC 1	AN6394	Integrated Circuit	
IC 2	TA7629P	"	
IC 3	AN6394	"	
IC 4	TA7629P	"	
IC 5	TC4066BP	"	
IC 6	LA4140	"	
Q 1	2SC2878AB	Transistor	
Q 2	DTC144WF	Digital Transistor	
Q 3	"	"	
Q 4	DTA144WF	"	
Q 5	2SD661TU	Transistor	
Q 6	2SC2021R	"	
Q 7	2SC2021LNE	"	
Q 8	"	"	
Q 9	2SD958TU	"	
Q10	"	"	
Q11	2SB788T	"	
Q12	2SC2021R	"	
Q13	DTA144WF	Digital Transistor	
Q14	2SC2878AB	Transistor	
Q15	DTC144WF	Digital Transistor	
Q16	"	"	
Q17	2SD661TU	Transistor	
Q18	2SC2021R	"	
Q19	2SC2021LNE	"	
Q20	"	"	
Q21	2SD958TU	"	
Q22	"	"	
Q23	2SB788TU	"	
Q24	2SC2021R	"	
Q25	DTA144WF	Digital Transistor	
Q26	DTC144WF	"	
Q27	"	"	
Q28	"	"	
Q29	"	"	
Q30	"	"	
Q31	"	"	
Q32	"	"	
Q33	"	"	
Q34	"	"	
Q35	"	"	
Q36	2SC2878AB	Transistor	
Q37	"	"	
Q38	DTC144WF	Digital Transistor	
Q39	"	"	
Q40	2SC2878AB	Transistor	
Q41	"	"	
Q42	2SC2021R	"	
Q43	2SB793AR	"	
Q44	2SD973AR	"	
Q45	DTC144WF	Digital Transistor	
Q46	DTA144WF	"	
Q47	"	"	
Q48	2SC2655Y	Transistor	
Q49	2SD973AR	"	

Symbol No.	Part No.	Part Name	Description
Q50	DTC144WF	Digital Transistor	
Q51	"	"	
Q52	2SB643R	Transistor	
Q53	2SC2878AB	"	
Q54	"	"	
Q55	"	"	
Q56	"	"	
Q57	2SB643R	"	
D 1	1SS133	Diode	
D 2	MA150	"	
D 3	1SS133	"	
D 4	MA150	"	
D 5	1SS133	"	
D 6	"	"	
D 7	-	-	
D 8	RD3.6EB2	Zener Diode	
D 9	-	-	
D10	RD3.6EB2	Zener Diode	
D11	"	"	
D12	1SS133	Diode	
D13	"	"	
D14	RD3.6EB2	Zener Diode	
D15	-	-	
D16	RD3.6EB2	Zener Diode	
D17	1SS133	Diode	
D18	"	"	
D19	"	"	
D20	"	"	
D21	RD3.6EB2	Zener Diode	
D22	1SS133	Diode	
D23	"	"	
D24	OA90	"	
D25	"	"	
D26	"	"	
D27	"	"	
D28	-	-	
D29	-	-	
D30	1SS133	Diode	
D31	"	"	
D32	MA162	"	
D33	"	"	
D34	1SS133	"	
D35	"	"	

Symbol No.	Part No.	Part Name	Description
R 1	QRD167J-103	CR	
R 2	" -103	"	
R 3	" -123	"	
R 4	" -821	"	
R 5	" -393	"	
R 6	QVP4A0B-152	VR	
R 7	QRD167J-102	CR	
R 8	" -102	"	
R 9	QVP4A0B-103	VR	
R10	QRD167J-102	CR	
R11	" -332	"	
R12	QVP4A0B-222	VR	
R13	" -101	"	
R14	QRD167J-223	CR	
△R15	QRX019J-151S	MFR	
R16	QRD167J-102	CR	
R17	" -183	"	
△R18	QRX019J-151S	MFR	
R19	QRD167J-154	CR	
R20	" -274	"	
R21	" -332	"	
R22	" -332	"	
R23	" -562	"	
R24	" -181	"	
R25	" -562	"	
R26	" -273	"	
R27	" -473	"	
R28	" -103	"	
R29	" -103	"	
R30	" -103	"	
R31	" -682	"	
R32	" -103	"	
R33	" -334	"	
R34	" -104	"	
R35	" -100	"	
R36	" -153	"	
R37	" -102	"	
R38	" -103	"	
R39	" -333	"	
R40	" -564	"	
R41	" -473	"	
R42	" -473	"	
R43	" -222	"	
R44	" -221	"	
R45	" -473	"	
R46	" -222	"	
R47	" -221	"	
△R48	QRX019J-151S	MFR	
R49	QRD167J-393	CR	
R50	" -183	"	
R51	QVP4A0B-102	VR	
R52	QRD167J-823	CR	
R53	" -223	"	
R54	" -472	"	
R55	" -122	"	
R56	" -821	"	
R57	" -822	"	
R58	" -183	"	
R59	" -153	"	
R60	" -183	"	
R61	" -153	"	
R62	" -103	"	
R63	" -103	"	
R64	" -123	"	
R65	" -821	"	

Symbol No.	Part No.	Part Name	Description
R66	QRD167J-393	CR	
R67	QVP4A0B-152	VR	
R68	QRD167J-102	CR	
R69	" -102	"	
R70	OVP4A0B-103	VR	
R71	QRD167J-102	CR	
R72	" -332	"	
R73	QVP4A0B-222	VR	
R74	" -101	"	
R75	QRD167J-223	CR	
△R76	QRX019J-151S	MFR	
R77	QRD167J-102	CR	
R78	" -183	"	
△R79	QRX019J-151S	MFR	
R80	QRD167J-154	CR	
R81	" -274	"	
R82	" -332	"	
R83	" -332	"	
R84	" -562	"	
R85	" -181	"	
R86	" -562	"	
R87	" -273	"	
R88	" -473	"	
R89	" -103	"	
R90	" -103	"	
R91	" -682	"	
R92	" -334	"	
R93	" -104	"	
R94	" -103	"	
R95	" -103	"	
R96	" -100	"	
R97	" -153	"	
R98	" -102	"	
R99	" -103	"	
R100	" -333	"	
R101	" -564	"	
R102	" -473	"	
R103	" -473	"	
R104	" -222	"	
R105	" -221	"	
R106	" -473	"	
R107	" -222	"	
R108	" -221	"	
R109	" -393	"	
R110	" -183	"	
△R111	QRX019J-151S	MFR	
R112	QRD167J-823	CR	
R113	QVP4A0B-102	VR	
R114	QRD167J-223	CR	
R115	" -472	"	
R116	" -122	"	
R117	" -821	"	
R118	" -822	"	
R119	" -183	"	
R120	" -153	"	
R121	" -183	"	
R122	" -153	"	
R123	" -183	"	
R124	" -392	"	
R125	" -273	"	
R126	" -392	"	
R127	" -103	"	
R128	" -103	"	
R129	" -153	"	
R130	-	-	-

Symbol No.	Part No.	Part Name	Description
R131	QRD167J-103	CR	
R132	" -183	"	
R133	" -153	"	
R134	-	-	
R135	QRD167J-103	CR	
R136	" -103	"	
R137	" -183	"	
R138	-	-	
R139	QRD167J-273	CR	
R140	-	-	
R141	QRD167J-103	CR	
R142	" -103	"	
R143	" -153	"	
R144	-	-	
R145	QRD167J-103	CR	
R146	" -562	"	
R147	" -122	"	
R148	" -122	"	
R149	" -123	"	
R150	" -123	"	
R151	" -102	"	
R152	" -154	"	
R153	" -183	"	
R154	" -153	"	
R155	-	-	
R156	QRD167J-103	CR	
R157	" -562	"	
R158	" -122	"	
R159	" -122	"	
R160	" -123	"	
R161	" -123	"	
R162	" -102	"	
R163	" -154	"	
△ R164	QRX019J-151S	MFR	
R165	QRD167J-103	CR	
R166	" -103	"	
R167	" -222	"	
R168	" -222	"	
R169	" -104	"	
R170	" -104	"	
R171	" -392	"	
R172	" -124	"	
R173	" -183	"	
R174	" -821	"	
R175	" -101	"	
R176	" -101	"	
R177	" -681	"	
R178	" -681	"	
R179	" -102	"	
R180	QVP4A0B-103	VR	
R181	QRD167J-102	CR	
R182	QVP4A0B-103	VR	
R183	" -104	"	
R184	" -104	"	
R185	QRD167J-681	CR	
R186	" -471	"	
R187	-	-	
R188	-	-	
R189	-	-	
R190	-	-	
R191	QRD167J-182	CR	
R192	" -222	"	
R193	" -223	"	
R194	" -104	"	
R195	" -103	"	

Symbol No.	Part No.	Part Name	Description
R196	QRD167J-102	CR	
R197	" -102	"	
R198	" -561	"	
R199	" -561	"	
R200	" -102	"	
R201	" -561	"	
R202	" -561	"	
R203	" -104	"	
R204	" -104	"	
R205	" -822	"	
R206	" -822	"	
R207	" -681	"	
R208	" -562	"	
C 1	QFN41HK-102	MY Cap	
C 2	QET41EM-335	E Cap	
C 3	" -475	"	
C 4	QET41CM-336	"	
C 5	QET41EM-335	"	
C 6	QET41CM-106	"	
C 7	" -476	"	
C 8	QET41EM-335	"	
C 9	QET41CM-106	"	
C10	QFN41HJ-823	MY Cap	
C11	QET41CM-106	E Cap	
C12	" -106	"	
C13	QET41EM-335	"	
C14	" -335	"	
C15	" -335	"	
C16	QET41HM-105	"	
C17	QFN41HJ-333	MY Cap	
C18	QET41CM-106	E Cap	
C19	QET41EM-335	"	
C20	QET41CM-106	"	
C21	" -106	"	
C22	" -476	"	
C23	" -107	"	
C24	QET40JM-107	"	
C25	QEB41HM-334	"	
C26	QET41CM-227	"	
C27	QEB41HM-104	"	
C28	QET41CM-227	"	
C29	QET41HM-474	"	
C30	QFN41HJ-103	MY Cap	
C31	QET41CM-106	E Cap	
C32	QFN41HK-273	MY Cap	
C33	" -473	"	
C34	" -562	"	
C35	QET41EM-335	E Cap	
C36	QFN41HK-472	MY Cap	
C37	" -122	"	
C38	" -122	"	
C39	" -472	"	
C40	QCS11HJ-102	C Cap	
C41	QET41HM-474	E Cap	
C42	QFN41HK-103	MY Cap	
C43	QET41EM-475	E Cap	
C44	QEB41CM-106	"	

Symbol No.	Part No.	Part Name	Description
C45	QET41EM-335	E Cap	
C46	QET41CM-226	"	
C47	QET41EM-335	"	
C48	" -226	"	
C49	QET41CM-337	"	
C50	QFN41HK-102	MY Cap	
C51	" -182	"	
C52	" -102	"	
C53	QET41EM-335	E Cap	
C54	" -475	"	
C55	QET41CM-336	"	
C56	QET41EM-335	"	
C57	QET41CM-106	"	
C58	" -476	"	
C59	QET41EM-335	"	
C60	QET41CM-106	"	
C61	QFN41HJ-823	MY Cap	
C62	QET41CM-106	E Cap	
C63	" -106	"	
C64	QET41EM-335	"	
C65	" -335	"	
C66	" -335	"	
C67	QET41HM-105	"	
C68	QFN41HJ-333	MY Cap	
C69	QET41CM-106	E Cap	
C70	QET41EM-335	"	
C71	QET41CM-106	"	
C72	" -106	"	
C73	" -476	"	
C74	QET40JM-107	"	
C75	QET41CM-107	"	
C76	QEB41HK-334	LL Cap	
C77	QET41CM-227	E Cap	
C78	QEB41HK-104	LL Cap	
C79	QET41CM-227	E Cap	
C80	QET41HM-474	"	
C81	QFN41HJ-103	MY Cap	
C82	QET41CM-106	E Cap	
C83	QFN41HK-273	MY Cap	
C84	" -473	"	
C85	" -562	"	
C86	QET41EM-335	E Cap	
C87	QFN41HK-472	MY Cap	
C88	" -122	"	
C89	" -122	"	
C90	" -472	"	
C91	QCS11HJ-102	C Cap	
C92	QET41HM-474	E Cap	
C93	QFN41HK-103	MY Cap	
C94	QET41EM-475	E Cap	
C95	QEB41CM-106	"	
C96	QET41EM-335	"	
C97	QET41CM-226	"	
C98	QET41EM-335	"	
C99	QET41CM-226	"	
C100	" -337	"	
C101	QFN41HK-102	MY Cap	
C102	" -182	"	
C103	QET41EM-475	E Cap	
C104	" -475	"	
C105	" -475	"	
C106	" -475	"	
C107	" -475	"	
C108	" -476	"	
C109	" -106	"	

Symbol No.	Part No.	Part Name	Description
C110	QET41EM-475	E Cap	
C111	" -476	"	
C112	" -106	"	
C113	QET41CM-337	"	
C114	QEN41HM-225	NP Cap	
C115	" -225	"	
C116	QCS11HJ-331	C Cap	
C117	QET41EM-335	E Cap	
C118	" -335	"	
C119	QCS11HJ-221	C Cap	
C120	QCF11HP-222	"	
C121	QFN41HK-683	MY Cap	
C122	QET41CM-477	E Cap	
C123	" -476	"	
C124	QFN41HK-103	MY Cap	
C125	QET41CM-107	E Cap	
C126	QET41EM-335	"	
C127	QET41CM-106	"	
C128	QET41EM-335	"	
C129	QET41CM-106	"	
C130	QCS11HJ-101	C Cap	
C131	" -101	"	
C132	QET41CM-337	E Cap	
C133	" -107	"	
C134	" -107	"	
C135	QET41HM-474	"	
C136	QET41CM-476	"	
C137	QET41HM-474	"	
C138	QET41CM-476	"	
C139	QFN41HK-182	MY Cap	
C140	" -182	"	
C141	QCF11HP-223	C Cap	
C142	QET41EM-335	E Cap	
C143	" -335	"	
C144	" -476	"	
C145	QET41CM-107	"	
C146	QCS11HJ-390	C Cap	
C147	" -101	"	
C148	" -101	"	
C149	QFN41HK-123	MY Cap	
C150	" -123	"	
△ CP 1		ICP-F10	IC Protector
△ CP 2		"	"
L 1	A04725-4700	Peaking Coil	
L 2	PU51764	L.P.F.	
L 3	A04725-4700	Peaking Coil	
L 4	PU51764	L.P.F.	
L 5	A04725-820	Peaking Coil	
L 6	PU48530-391	"	
L 7	" -391	"	
△	PGZ00034	Osc. Block	
RY 1	PU46682	Relay	
RY 2	"	"	

6.2.2 PB Y Circuit Board Ass'y 02 PGE20003A-1

Symbol No.	Part No.	Part Name	Description
CN 1	PU43351-3	Cap. Housing	
CN 2	" -2R	"	
CN 3	" -3Y	"	
CN 4	" -3	"	
CN 5	" -3	"	
CN 6	" -2	"	
CN 7	" -3Y	"	
CN 8	" -6	"	
CN 9	" -3	"	
CN10	" -4	"	
CN11	" -3R	"	
CN12	" -4	"	
CN13	" -2Y	"	
CN14	" -4R	"	
CN15	" -4	"	
CN16	" -2	"	
CN17	" -2R	"	
CN18	" -3	"	
CN19	" -4Y	"	
CN20	" -2	"	
	PU52104 PU54969-2	Tapping Support Wire Clamp	
	PU50766	Test Pin	TP1-19

Symbol No.	Part No.	Part Name	Description
IC 1	TA7347P	Integrated Circuit	
IC 2	SN76670N	"	
IC 3	TA7347P	"	
IC 4	VC2011	"	
IC 5	"	"	
IC 6	7VT05	"	
IC 7	TA7350P	"	
IC 8	7VT05	"	
IC 9	AN608P	"	
Q 1	2SC2647C	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	"	"	
Q 5	"	"	
Q 6	"	"	
Q 7	-	-	
Q 8	2SD638R	Transistor	
Q 9	2SC2647C	"	
Q10	"	"	
Q11	"	"	
Q12	"	"	
Q13	2SB641Q	"	
Q14	2SC2647C	"	
Q15	"	"	
Q16	"	"	
Q17	"	"	
Q18	"	"	
Q19	"	"	
Q20	"	"	
Q21	"	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	1SS99	"	
D 4	"	"	
D 5	1SS133	"	
D 6	"	"	
D 7	MA27WA	"	
D 8	1SS93	"	
D 9	"	"	
D10	"	"	
D11	"	"	

Symbol No.	Part No.	Part Name	Description
R 1	QRD167J-681	CR	
R 2	" -103	"	
R 3	" -152	"	
R 4	" -563	"	
R 5	" -223	"	
R 6	QVZ3506-223	VR	
R 7	QRD167J-223	CR	
R 8	" -154	"	
R 9	" -102	"	
R10	" -391	"	
R11	" -272	"	
R12	" -272	"	
R13	" -681	"	
R14	" -823	"	
R15	" -102	"	
R16	" -821	"	
R17	" -153	"	
R18	QVZ3506-223	VR	
R19	QRD167J-391	CR	
R20	" -391	"	
R21	" -222	"	
R22	" -222	"	
R23	" -471	"	
R24	" -471	"	
R25	" -221	"	
R26	" -103	"	
R27	QVZ3506-222	VR	
R28	" -222	"	
R29	QRD167J-333	CR	
R30	" -563	"	
R31	" -222	"	
R32	" -153	"	
R33	" -222	"	
R34	" -222	"	
R35	" -682	"	
R36	" -331	"	
R37	" -102	"	
R38	" -221	"	
R39	" -562	"	
R40	" -331	"	
R41	" -333	"	
R42	" -222	"	
R43	" -103	"	
R44	" -471	"	
R45	" -750	"	
R46	" -750	"	
R47	" -750	"	
R48	" -102	"	
R49	" -103	"	
R50	-	-	
R51	-	-	
R52	-	-	
R53	QRD167J-271	CR	
R54	-	-	
R55	QVZ3506-223	VR	
R56	-	-	
R57	QRD167J-332	CR	
R58	" -223	"	
R59	-	-	
R60	QRD167J-332	CR	
R61	" -103	"	
R62	" -392	"	
R63	" -103	"	
R64	" -472	"	
R65	" -153	"	

Symbol No.	Part No.	Part Name	Description
R66	QRD167J-103	CR	
R67	" -103	"	
R68	" -103	"	
R69	" -471	"	
R70	" -222	"	
R71	" -223	"	
R72	" -333	"	
R73	QVZ3506-471	VR	
R74	QRD167J-471	CR	
R75	QVZ3506-102	VR	
R76	QRD167J-333	CR	
R77	" -103	"	
R78	" -223	"	
R79	" -681	"	
R80	" -472	"	
R81	" -223	"	
R82	" -223	"	
R83	QVZ3506-471	VR	
R84	QRD167J-391	CR	
R85	" -222	"	
R86	" -103	"	
R87	" -3R3	"	
R88	" -3R3	"	
R89	" -100	"	
R90	" -681	"	
R91	" -122	"	
R92	" -221	"	
R93	" -183	"	
R94	" -271	"	
R95	" -102	"	
R96	" -561	"	
R97	" -681	"	
R98	" -103	"	
R99	" -103	"	
R100	" -223	"	
R101	" -103	"	
R102	" -101	"	
R103	QVZ3506-682	VR	
R104	QRD167J-221	CR	
R105	QVZ3506-103	VR	
R106	QRD167J-103	CR	
R107	" -223	"	
R108	" -103	"	
R109	" -223	"	
R110	" -103	"	
R111	" -680	"	
R112	" -103	"	
R113	" -560	"	
R114	" -102	"	
R115	" -102	"	
R126	QRD167J-153	CR	

Symbol No.	Part No.	Part Name	Description
C 1	QET41CM-107	E Cap	
C 2	QCF11EZ-473	C Cap	
C 3	" -223	"	
C 4	QET41CM-107	E Cap	
C 5	QFN41HK-223	MY Cap	
C 6	QCS11HJ-820	C Cap	
C 7	QFN41HK-223	MY Cap	
C 8	" -223	"	
C 9	QCF11EZ-473	C Cap	
C10	" -223	"	
C11	QET41CM-107	E Cap	
C12	QCF11EZ-223	C Cap	
C13	QEK41CM-106	E Cap	
C14	QCF11EZ-223	C Cap	
C15	QCS11HJ-331	MY Cap	
C16	" -560	"	
C17	QET41CM-107	E Cap	
C18	QCF11EZ-473	C Cap	
C19	QFN41HK-223	MY Cap	
C20	QET41CM-107	E Cap	
C21	QCF11EZ-223	C Cap	
C22	" -223	"	
C23	QEK41CM-476	E Cap	
C24	QCF11EZ-223	C Cap	
C25	QEK41CM-476	E Cap	
C26	QCS11HJ-331	C Cap	
C27	" -221	"	
C28	" -270	"	
C29	QCF11EZ-223	"	
C30	QET41CM-107	E Cap	
C31	QEK41CM-476	"	
C32	" -476	"	
C33	" -476	"	
C34	QCS11HJ-390	C Cap	
C35	QCF11EZ-223	"	
C36	QET41CM-107	E Cap	
C37	QCF11EZ-223	C Cap	
C38	QCS11HJ-221	"	
C39	QEK41CM-476	E Cap	
C40	-	-	
C41	QET41CM-107	E Cap	
C42	QCS11HJ-121	C Cap	
C43	QCF11EZ-223	"	
C44	" -223	"	
C45	QET41CM-107	E Cap	
C46	QET40JM-228	"	
C47	QET41CM-107	"	
C48	QCF11EZ-223	C Cap	
C49	QEK41CM-476	E Cap	
C50	-	-	
C51	QFN41HK-223	MY Cap	
C52	QET41CM-107	E Cap	
C53	QCF11EZ-223	C Cap	
C54	QEK41HM-105	E Cap	
C55	QFN41HK-102	MY Cap	
C56	QET41CM-107	E Cap	
C57	QCF11EZ-223	C Cap	
C58	QEK41HM-474	E Cap	
C59	QEK41HM-105	"	
C60	QET41CM-107	"	
C61	QCF11EZ-223	C Cap	
C62	QEK41CM-476	E Cap	
C63	" -476	"	
C64	QET41AM-107	"	
C65	QCF11EZ-223	C Cap	

Symbol No.	Part No.	Part Name	Description
C66	QCF11EZ-223	C Cap	
C67	QEK41CM-106	E Cap	
C68	QET41CM-107	"	
C69	QCF11EZ-223	C Cap	
C70	" -223	"	
C71	" -223	"	
C72	QET41AM-107	E Cap	
C73	QCF11EZ-223	C Cap	
C74	QEK41HM-105	E Cap	
C75	QET41CM-107	"	
C76	QCF11EZ-223	C Cap	
C77	QFN41HK-223	MY Cap	
C78	QCS11HJ-331	C Cap	
C79	QCF11EZ-223	"	
C80	QFN41HK-333	MY Cap	
C81	QCF11EZ-223	C Cap	
C82	QET41AM-107	E Cap	
C83	QCF11EZ-223	C Cap	
C84	" -223	"	
C85	QET41CM-107	E Cap	
C86	QCS11HJ-331	C Cap	
C87	" -681	"	
C88	" -391	"	
C89	QCF11EZ-223	"	
C90	QEK41CM-476	E Cap	
C91	QET41AM-107	"	
C92	QEK41CM-476	"	
C93	QET41CM-107	"	
C94	QCF11EZ-223	C Cap	
C95	" -223	"	
C96	QET41CM-107	E Cap	
C97	QEK41CM-476	"	
C98	QEK41HM-225	"	
C99	" -334	"	
C107	QFN41HK-272	MY Cap	
L 1	PU48530-221K	Peaking Coil	
L 2	" -221K	"	
L 3	" -221K	"	
L 4	" -221K	"	
L 5	" -680K	"	
L 6	" -221K	"	
L 7	" -150K	"	
L 8	" -221K	"	
L 9	" -221K	"	
L10	" -221K	"	
L11	" -221K	"	
L12	" -221K	"	
L13	" -221K	"	
L14	" -221K	"	
L15	" -221K	"	
L16	" -221K	"	
L17	" -221K	"	

6.2.3 PB Color Circuit Board Ass'y 0 3 PGE20004A-1

Symbol No.	Part No.	Part Name	Description
LPF 1	PU50746	L.P.F.	
LPF 2	"	"	
EQ 1	PU48519-2	Equalizer	
EQ 2	" -2	"	
DL 1	PU43628	Delay Line	
SW 1	PU49847	Slide Switch	
CN 1	PU43351-2R	Cap. Housing	
CN 2	" -4	"	
CN 3	" -2	"	
CN 4	" -4	"	
CN 5	" -2Y	"	
CN 6	" -2R	"	
CN 7	" -2	"	
CN 8	" -2	"	
CN 9	" -5Y	"	
CN10	" -4	"	
CN11	" -6	"	
CN12	" -2	"	
CN13	-	-	
CN14	PU43351-2	Cap. Housing	
	PU50766	Test Pin	TP1-6

Symbol No.	Part No.	Part Name	Description
IC 1	TA7347P	Integrated Circuit	
IC 2	AN6360	"	
IC 3	8VT11	"	
IC 4	AN607P	"	
IC 5	TA7347P	"	
IC 6	"	"	
IC 7	AN6361N	"	
IC 8	AN6362	"	
IC 9	TC4538BP	"	
IC10	TA7347P	"	
Q 1	2SC2647C	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	"	"	
Q 5	"	"	
Q 6	"	"	
Q 7	"	"	
Q 8	"	"	
Q 9	"	"	
Q10	2SB641Q	"	
Q11	2SC2647C	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
Q15	"	"	
Q16	2SB641Q	"	
Q17	2SC2647C	"	
Q18	"	"	
Q19	"	"	
Q20	"	"	
Q21	2SB641Q	"	
Q22	2SC2647C	"	
D 1	RD9.1EB3	Zener Diode	
D 2	1SS133	Diode	
D 3	"	"	
D 4	-	-	
D 5	1SS133	Diode	
D 6	-	-	
D 7	1SS133	Diode	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	RD4.3EB1	Zener Diode	
D12	1SS133	Diode	

Symbol No.	Part No.	Part Name	Description
R 1	QRD167J-223	CR	
R 2	" -563	"	
R 3	" -102	"	
R 4	QVP4A0B-102	VR	
R 5	-	-	
R 6	QRD167J-474	CR	
R 7	QVP4A0B-103	VR	
R 8	QRD167J-684	CR	
R 9	" -224	"	
R10	" -392	"	
R11	" -221	"	
R12	" -102	"	
R13	QVP4A0B-103	VR	
R14	QRD167J-471	CR	
R15	QVP4A0B-222	VR	
R16	QRD167J-331	CR	
R17	-	-	
R18	QRD167J-332	CR	
R19	" -562	"	
R20	" -332	"	
R21	" -223	"	
R22	" -102	"	
R23	" -102	"	
R24	" -102	"	
R25	" -102	"	
R26	" -101	"	
R27	" -392	"	
R28	" -681	"	
R29	" -681	"	
R30	" -392	"	
R31	" -563	"	
R32	" -223	"	
R33	" -222	"	
R34	" -103	"	
R35	" -103	"	
R36	" -103	"	
R37	" -393	"	
R38	" -101	"	
R39	" -222	"	
R40	" -471	"	
R41	" -102	"	
R42	" -391	"	
R43	" -223	"	
R44	" -563	"	
R45	" -122	"	
R46	" -102	"	
R47	" -102	"	
R48	" -472	"	
R49	" -184	"	
R50	" -182	"	
R51	" -222	"	
R52	" -394	"	
R53	" -683	"	
R54	" -223	"	
R55	" -392	"	
R56	" -183	"	
R57	" -473	"	
R58	" -471	"	
R59	" -471	"	
R60	" -472	"	
R61	" -122	"	
R62	" -562	"	
R63	QVP4A0B-471	VR	
R64	QRD121J-681	CR	
R65	QRD167J-392	"	

Symbol No.	Part No.	Part Name	Description
R66	QRD167J-222	CR	
R67	" -103	"	
R68	" -103	"	
R69	" -122	"	
R70	" -562	"	
R71	" -473	"	
R72	" -562	"	
R73	" -122	"	
R74	" -102	"	
R75	" -103	"	
R76	" -103	"	
R77	" -103	"	
R78	" -152	"	
R79	" -222	"	
R80	" -222	"	
R81	" -221	"	
R82	" -153	"	
R83	" -223	"	
R84	" -123	"	
R85	" -123	"	
R86	" -562	"	
R87	" -223	"	
R88	" -223	"	
R89	QVP4A0B-104	VR	
R90	QRD167J-223	CR	
R91	QVP4A0B-104	VR	
R92	QRD167J-223	CR	
R93	" -223	"	
R94	" -223	"	
R95	" -223	"	
R96	" -223	"	
R97	" -221	"	
R98	" -392	"	
R99	" -223	"	
R100	" -123	"	
R101	" -103	"	
R102	" -223	"	
R103	" -223	"	
R104	" -103	"	
R105	" -103	"	
R106	" -103	"	
R107	" -472	"	
R108	" -103	"	
R109	" -103	"	
R110	" -103	"	
R111	" -101	"	
R112	" -472	"	
R113	" -331	"	
R114	" -103	"	
R115	" -223	"	
R116	" -122	"	
R117	" -223	"	
R118	" -563	"	
R119	" -331	"	
R120	" -223	"	

Symbol No.	Part No.	Part Name	Description
C 1	QET41CM-107	E Cap	
C 2	QCF11EZ-473	C Cap	
C 3	QFN41HK-103	MY Cap	
C 4	QEK41CM-476	E Cap	
C 5	QCF11EZ-223	C Cap	
C 6	QFN41HK-103	MY Cap	
C 7	QCF11EZ-102	C Cap	
C 8	QFN41HK-333	MY Cap	
C 9	QEK41HM-105	E Cap	
C10	QFN41HK-103	MY Cap	
C11	—	—	
C12	QFN41HK-103	MY Cap	
C13	—	—	
C14	QFN41HK-103	MY Cap	
C15	— -103	“	
C16	QCF11EZ-102	C Cap	
C17	— -223	“	
C18	QEK41CM-476	E Cap	
C19	QCF11EZ-102	C Cap	
C20	QAT3001-017	TR Cap	
C21	QFN41HK-103	MY Cap	
C22	QCF11EZ-223	C Cap	
C23	QEK41CM-476	E Cap	
C24	— -476	“	
C25	QCF11EZ-223	C Cap	
C26	QFN41HK-103	MY Cap	
C27	QCF11EZ-223	C Cap	
C28	QFN41HK-103	MY Cap	
C29	QEK41CM-476	E Cap	
C30	QCF11EZ-223	C Cap	
C31	QFN41HK-103	MY Cap	
C32	— -103	“	
C33	QCF11EZ-223	C Cap	
C34	QEK41CM-476	E Cap	
C35	QCF11EZ-102	C Cap	
C36	QFN41HK-103	MY Cap	
C37	— -103	“	
C38	QCF11EZ-223	C Cap	
C39	QEK41CM-476	E Cap	
C40	QAT3001-015	TR Cap	
C41	QCS11HJ-120	C Cap	
C42	— -121	“	
C43	— -121	“	
C44	QFN41HK-103	MY Cap	
C45	QEK41CM-476	E Cap	
C46	QCF11EZ-223	C Cap	
C47	QFN41HK-103	MY Cap	
C48	— -103	“	
C49	QCS11HJ-121	C Cap	
C50	QEK41HM-225	E Cap	
C51	QCS11HJ-220	C Cap	
C52	QFN41HK-103	MY Cap	
C53	QCS11HJ-270	C Cap	
C54	— -8R0	“	
C55	QAT3001-017	TR Cap	
C56	QCS11HJ-3R0	C Cap	
C57	QFN41HK-103	MY Cap	
C58	— -103	“	
C59	QCF11EZ-223	C Cap	
C60	QEK41CM-476	E Cap	
C61	QCF11EZ-223	C Cap	
C62	— -223	“	
C63	QEK41CM-106	E Cap	
C64	QCF11HP-473	C Cap	
C65	QEK41HM-105	E Cap	

Symbol No.	Part No.	Part Name	Description
C66	QCF11EZ-102	C Cap	
C67	QFN41HK-104	MY Cap	
C68	QEK41HM-105	E Cap	
C69	QFN41HK-103	MY Cap	
C70	QCS11HJ-221	C Cap	
C71	QFN41HK-103	MY Cap	
C72	QCS11HJ-121	C Cap	
C73	— -181	“	
C74	QFN41HK-183	MY Cap	
C75	QEK41CM-106	E Cap	
C76	QEK41CM-476	“	
C77	QCF11EZ-223	C Cap	
C78	— -223	“	
C79	QEK41CM-476	E Cap	
C80	QFN41HK-102	MY Cap	
C81	QCF11EZ-223	C Cap	
C82	QFN41HK-153	MY Cap	
C83	QCS11HJ-560	C Cap	
C84	— -270	“	
C85	QCF11EZ-223	“	
C86	QEK41CM-476	E Cap	
C87	QCS11HJ-221	C Cap	
C88	QEK41CM-106	E Cap	
C89	QFN41HK-223	MY Cap	
C90	— -223	“	
C91	QEK41CM-476	E Cap	
C92	QCF11EZ-223	C Cap	
C93	QCS11HJ-181	“	
C94	QCF11EZ-223	“	
C95	QEK41CM-476	E Cap	
C96	— -476	“	
C97	QCF11EZ-223	C Cap	
C98	QEK41CM-476	E Cap	
C99	QCF11EZ-223	C Cap	
C100	QCS11HJ-680	“	
C101	— -151	“	
C102	— -471	“	
C103	QFN41HK-103	MY Cap	
C104	QCF11EZ-223	C Cap	
C105	QEK41CM-476	E Cap	
C106	QFN41HK-103	MY Cap	
C107	— -104	“	
C108	QFN41HJ-182	“	
L 1	PU48530-221K	Peaking Coil	
L 2	— -221K	“	
L 3	— -680K	“	
L 4	— -221K	“	
L 5	— -221K	“	
L 6	— -221K	“	
L 7	— -221K	“	
L 8	— -221K	“	
L 9	— -221K	“	
L10	— -820K	“	
L11	— -560K	“	
L12	— -680K	“	
L13	— -221K	“	
L14	— -101K	“	

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Symbol No.	Part No.	Part Name	Description
L15	PU48530-221K	Peaking Coil	
L16	" -221K	"	
L17	PU30771-6	Coil	
L18	" -6	"	
L19	PU48530-221K	Peaking Coil	
L20	" -221K	"	
L21	" -221K	"	
L22	" -221K	"	
L23	A04725-6800	"	
L24	PU48530-221K	"	
BPF 1	PU30190-2D	B.P.F.	
△CF 1	PGZ00104	Ceramic Filter	
DL 1	PU50723	Delay Line	
X 1	PU47931-2	Crystal	
X 2	GU40625	"	
CN 1	PU43351-2	Cap. Housing	
CN 2	" -2	"	
CN 3	" -4R	"	
CN 4	" -4	"	
CN 5	" -6	"	
CN 6	" -2R	"	
CN 7	" -2Y	"	
CN 8	" -5	"	
CN 9	" -2	"	
CN10	" -2R	"	
	PU33643	Shield Case	
	GBST3006Z	Tapping Screw	
	PU53811	Hook (B)	
	GBST3006Z	Tapping Screw	
	PU32908	Servo P.W.B. Stay	
	GBST3006Z	Tapping Screw	
	PU50766	Test Pin	TP2-17

Symbol No.	Part No.	Part Name	Description
IC 1	TA7348P	Integrated Circuit	
IC 2	AN6310	"	
IC 3	TA7347P	"	
IC 4	"	"	
IC 5	TA7348P	"	
IC 6	AN6360	"	
IC 7	AN607P	"	
IC 8	TA7347P	"	
△IC 9	AN6361N	"	
IC10	TA7347P	"	
IC11	AN6362	"	
Q 1	2SC2647C	Transistor	
Q 2	"	"	
Q 3	2SB641Q	"	
Q 4	2SC2647C	"	
Q 5	"	"	
Q 6	"	"	
Q 7	"	"	
Q 8	"	"	
Q 9	"	"	
Q10	"	"	
Q11	"	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
Q15	2SB641Q	"	
Q16	2SC2647C	"	
Q17	DTC124N	D. Transistor	
Q18	2SD638R	Transistor	
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
R 1	QRD167J-102	CR	
R 2	" -103	"	
R 3	" -101	"	
R 4	" -333	"	
R 5	" -333	"	
R 6	" -103	"	
R 7	" -101	"	
R 8	" -103	"	
R 9	" -821	"	

Symbol No.	Part No.	Part Name	Description
R10	QRD167J-821	CR	
R11	" -123	"	
R12	QVP4A0B-472	VR	
R13	QRD167J-562	CR	
R14	" -392	"	
R15	QVP4A0B-103	VR	
R16	QRD167J-123	CR	
R17	" -332	"	
R18	" -103	"	
R19	" -223	"	
R20	" -331	"	
R21	QVP4A0B-473	VR	
R22	QRD167J-153	CR	
R23	" -101	"	
R24	" -153	"	
R25	" -561	"	
R26	" -222	"	
R27	" -152	"	
R28	" -332	"	
R29	" -102	"	
R30	" -124	"	
R31	" -472	"	
R32	" -122	"	
R33	" -103	"	
R34	" -122	"	
R35	QVP4A0B-104	VR	
R36	QRD167J-332	CR	
R37	" -101	"	
R38	" -563	"	
R39	" -223	"	
R40	" -391	"	
R41	" -391	"	
R42	" -471	"	
R43	" -471	"	
R44	QVP4A0B-222	VR	
R45	" -222	"	
R46	QRD167J-223	CR	
R47	" -563	"	
R48	" -681	"	
R49	" -102	"	
R50	" -102	"	
R51	" -102	"	
R52	" -563	"	
R53	" -563	"	
R54	" -223	"	
R55	" -103	"	
R56	" -563	"	
R57	" -103	"	
R58	-	-	
R59	QRD167J-223	CR	
R60	" -103	"	
R61	" -223	"	
R62	-	-	
R63	-	-	
R64	QRD167J-183	CR	
R65	" -682	"	
R66	" -122	"	
R67	-	-	
R68	QRD167J-681	CR	
R69	" -122	"	
R70	" -684	"	
R71	" -224	"	
R72	" -105	"	
R73	" -221	"	
R74	" -392	"	

Symbol No.	Part No.	Part Name	Description
R75	-	-	
R76	QRD167J-182	CR	
R77	-	-	
R78	QRD167J-222	CR	
R79	" -222	"	
R80	" -563	"	
R81	" -222	"	
R82	" -222	"	
R83	" -223	"	
R84	" -223	"	
R85	" -223	"	
R86	" -223	"	
R87	" -562	"	
R88	" -223	"	
R89	" -223	"	
R90	" -562	"	
R91	" -223	"	
R92	" -122	"	
R93	" -102	"	
R94	" -102	"	
R95	" -184	"	
R96	" -182	"	
R97	" -222	"	
R98	" -394	"	
R99	" -222	"	
R100	" -473	"	
R101	" -471	"	
R102	" -123	"	
R103	" -471	"	
R104	" -472	"	
R105	" -122	"	
R106	" -562	"	
R107	QVP4A0B-471	VR	
R108	QRD167J-222	CR	
R109	" -562	"	
R110	" -102	"	
R111	" -122	"	
R112	" -102	"	
R113	" -103	"	
R114	" -103	"	
R115	" -103	"	
R116	" -222	"	
R117	" -222	"	
R118	" -221	"	
R119	" -563	"	
R120	" -103	"	
R121	" -103	"	
R122	" -223	"	
R123	" -563	"	
R124	" -223	"	
R125	-	-	
R126	-	-	
R127	QRD121J-681	CR	
R128	QRD167J-221	"	
R129	" -102	"	
R130	" -102	"	

Symbol No.	Part No.	Part Name	Description
C 1	QCF11EZ-473	C Cap	
C 2	QET41CM-107	E Cap	
C 3	QET41AM-227	"	
C 4	QCF11EZ-223	C Cap	
C 5	QEK41CM-476	E Cap	
C 6	" -476	"	
C 7	" -476	"	
C 8	QCF11EZ-223	C Cap	
C 9	QET41CM-107	E Cap	
C10	QCF11EZ-223	C Cap	
C11	" -223	"	
C12	QET41CM-107	E Cap	
C13	QCF11EZ-223	C Cap	
C14	QAT3001-017	TR Cap	
C15	QCS11HJ-680	C Cap	
C16	" -471	"	
C17	" -330	"	
C18	QCF11EZ-223	"	
C19	QEK41HM-474	E Cap	
C20	QFN41HK-473	MY Cap	
C21	QEK41CM-336	E Cap	
C22	QCF11EZ-223	C Cap	
C23	QET41CM-107	E Cap	
C24	QCF11EZ-223	C Cap	
C25	QCS11HJ-151	"	
C26	QEK41CM-476	E Cap	
C27	QFN41HK-563	MY Cap	
C28	QEK41EM-335	E Cap	
C29	QEN40JM-477	NP Cap	
C30	QEK41CM-476	E Cap	
C31	QCF11EZ-223	C Cap	
C32	QEK41CM-476	E Cap	
C33	QET41CM-107	"	
C34	QCF11EZ-223	C Cap	
C35	" -223	"	
C36	QET41CM-107	E Cap	
C37	QEK41CM-476	"	
C38	" -476	"	
C39	" -476	"	
C40	" -476	"	
C41	QCF11EZ-223	C Cap	
C42	QET41CM-107	E Cap	
C43	QCS11HJ-820	C Cap	
C44	QFN41HK-103	MY Cap	
C45	QCS11HJ-151	C Cap	
C46	" -151	"	
C47	QFN41HK-103	MY Cap	
C48	" -103	"	
C49	QCF11EZ-223	C Cap	
C50	QET41CM-107	E Cap	
C51	QCF11EZ-102	C Cap	
C52	QEK41CM-476	E Cap	
C53	QCF11EZ-223	C Cap	
C54	" -223	"	
C55	QEK41CM-476	E Cap	
C56	-	-	
C57	QFN41HK-103	MY Cap	
C58	QCF11EZ-223	C Cap	
C59	QEK41CM-476	E Cap	
C60	QFN41HK-103	MY Cap	
C61	-	-	
C62	QFN41HK-103	MY Cap	
C63	QEK41CM-476	E Cap	
C64	QCF11EZ-102	C Cap	
C65	QFN41HK-103	MY Cap	

Symbol No.	Part No.	Part Name	Description
C66	QFN41HK-103	MY Cap	
C67	QEK41CM-106	E Cap	
C68	QCF11EZ-102	C Cap	
C69	" -102	"	
C70	-	-	
C71	QFN41HK-103	MY Cap	
C72	QCF11EZ-223	C Cap	
C73	QEK41CM-476	E Cap	
C74	QCF11EZ-102	C Cap	
C75	QFN41HK-104	MY Cap	
C76	-	-	
C77	QCF11EZ-223	C Cap	
C78	QEK41CM-476	E Cap	
C79	QFN41HK-223	MY Cap	
C80	QCF11EZ-223	C Cap	
C81	QEK41CM-476	E Cap	
C82	QFN41HK-223	MY Cap	
C83	QCF11EZ-102	C Cap	
C84	QFN41HK-154	MY Cap	
C85	QEK41CM-476	E Cap	
C86	QCF11EZ-223	C Cap	
C87	QFN41HK-103	MY Cap	
C88	" -103	"	
C89	" -103	"	
C90	" -103	"	
C91	QCS11HJ-101	C Cap	
C92	QCF11EZ-102	"	
C93	QEK41HM-225	E Cap	
C94	QFN41HK-103	MY Cap	
C95	QCS11HJ-270	C Cap	
C96	QAT3001-017	TR Cap	
C97	QCS11HJ-3R0	C Cap	
C98	QFN41HK-103	MY Cap	
C99	QCF11EZ-223	C Cap	
C100	QEK41CM-476	E Cap	
C101	QCF11EZ-223	C Cap	
C102	QFN41HK-103	MY Cap	
C103	QEK41CM-106	E Cap	
C104	QCF11EZ-223	C Cap	
C105	QEK41HM-105	E Cap	
C106	QCF11EZ-102	C Cap	
C107	QFN41HK-104	MY Cap	
C108	QCS11HJ-681	C Cap	
C109	" -121	"	
C110	" -181	"	
C111	QEK41HM-105	E Cap	
C112	QFN41HK-183	MY Cap	
C113	QEK41CM-106	E Cap	
C114	QFN41HK-102	MY Cap	
C115	QEK41CM-476	E Cap	
C116	QCF11EZ-223	C Cap	
C117	" -223	"	
C118	QEK41CM-476	E Cap	
C119	QFN41HK-153	MY Cap	
C120	QCS11HJ-820	C Cap	
C121	" -270	"	
C122	" -221	"	
C123	QCF11EZ-223	"	
C124	QEK41CM-476	E Cap	
C125	QFN41HK-103	MY Cap	
C126	" -103	"	
C127	QEK41CM-476	E Cap	
C128	QCF11EZ-223	C Cap	
C129	QEK41CM-106	E Cap	
C130	QCS11HJ-8R0	C Cap	

Symbol No.	Part No.	Part Name	Description
C131	QFN41HK-104	MY Cap	
C132	QCS11HJ-390	C Cap	
C133	QEK41CM-476	E Cap	
L 1	PU48530-221K	Peaking Coil	
L 2	" -221K	"	
L 3	" -820K	"	
L 4	" -120K	"	
L 5	" -221K	"	
L 6	" -221K	"	
L 7	" -221K	"	
L 8	" -221K	"	
L 9	" -470K	"	
L10	" -221K	"	
L11	" -221K	"	
L12	" -221K	"	
L13	" -221K	"	
L14	" -221K	"	
L15	" -221K	"	
L16	" -221K	"	
L17	" -221K	"	
L18	" -560K	"	
L19	" -680K	"	
L20	" -221K	"	
L21	" -101K	"	
L22	" -221K	"	
L23	PU30771-6	Coil	
L24	PU48530-221K	Peaking Coil	
L25	PU30771-6	Coil	
L26	PU48530-221K	Peaking Coil	
L27	" -181K	"	
L28	" -680J	"	
L29	" -680J	"	
LPF 1	PU50745	L.P.F.	
LPF 2	PU30192-7D	"	
LPF 3	PU30192-1D	"	
BPF 1	PU30190-1D	B.P.F.	
CF 1	PGZ00104	Ceramic Filter	
TH 1	ERT-D2FHK-202S	Thermistor	
EQ 1	PU48519-2	Equalizer	
EQ 2	PU50748	"	
X 1	GU40625	Crystal	

Symbol No.	Part No.	Part Name	Description
CN 1	PU43351-2Y	Cap. Housing	
CN 2	" -2	"	
CN 3	" -3	"	
CN 4	" -6	"	
CN 5	" -8	"	
CN 6	" -2R	"	
CN 7	" -2	"	
CN 8	" -2	"	
CN 9	" -4	"	
CN10	" -3	"	
CN11	" -2Y	"	
CN12	" -2	"	
CN13	" -2R	"	
PU50766		Test Pin	TP1-13

6.2.5 PRE/REC Circuit Board Ass'y 0 5
PGE20006A-1

Symbol No.	Part No.	Part Name	Description
IC 1	TA7347P	Integrated Circuit	
IC 2	AN6330	"	
IC 3	TA7347P	"	
IC 4	HA11702	"	
IC 5	TA7347P	"	
IC 6	AN6330	"	
IC 7	AN607P	"	
IC 8	VC2011	"	
IC 9	TA7347P	"	
Q 1	2SC2647C	Transistor	
Q 2	"	"	
Q 3	2SB641Q	"	
Q 4	2SB643R	"	
Q 5	2SD638R	"	
Q 6	"	"	
Q 7	2SB643R	"	
Q 8	"	"	
Q 9	2SC2647C	"	
Q10	"	"	
Q11	2SB643R	"	
Q12	2SC2647C	"	
Q13	2SB643R	"	
Q14	"	"	
Q15	"	"	
Q16	2SB641Q	"	
Q17	2SC941Y	"	
Q18	"	"	
Q19	2SC2647C	"	
Q20	"	"	
Q21	"	"	
Q22	2SC941Y	"	
Q23	"	"	
Q24	2SC2647C	"	
Q25	"	"	
Q26	"	"	
Q27	2SB745S	"	
Q28	2SC2647C	"	
Q29	"	"	
Q30	"	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	RD6.8EB1	Zener Diode	
D 4	1SS133	Diode	
D 5	RD6.8EB1	Zener Diode	
D 6	1SS133	Diode	

Symbol No.	Part No.	Part Name	Description
D 7	RD6.8EB1	Zener Diode	
D 8	1SS133	Diode	"
D 9	"	"	
D10	RD6.2EB2	Zener Diode	
D11	1SS133	Diode	
R 1	OVZ3506-222	VR	
R 2	" -222	"	
R 3	QRD167J-223	CR	
R 4	" -223	"	
R 5	" -222	"	
R 6	" -223	"	
R 7	" -223	"	
R 8	" -221	"	
R 9	" -222	"	
R10	" -222	"	
R11	" -391	"	
R12	" -563	"	
R13	" -223	"	
R14	" -183	"	
R15	" -561	"	
R16	" -103	"	
R17	" -220	"	
R18	" -102	"	
R19	" -102	"	
R20	" -562	"	
R21	" -562	"	
R22	" -102	"	
R23	" -220	"	
R24	" -220	"	
R25	" -4R7	"	
R26	" -4R7	"	
R27	" -472	"	
R28	" -472	"	
R29	" -331	"	
R30	" -103	"	
R31	" -103	"	
R32	" -103	"	
R33	" -103	"	
R34	" -123	"	
R35	" -562	"	
R36	" -103	"	
R37	" -103	"	
R38	" -123	"	
R39	" -562	"	
R40	" -103	"	
R41	" -562	"	
R42	" -123	"	
R43	" -331	"	
R44	" -562	"	
R45	" -123	"	
R46	" -472	"	
R47	" -331	"	
R48	" -472	"	
R49	" -562	"	
R50	" -123	"	

Symbol No.	Part No.	Part Name	Description
R51	QRD167J-472	CR	
R52	" -562	"	
R53	" -123	"	
R54	" -1R0	"	
R55	" -1R0	"	
R56	" -470	"	
R57	QVZ3506-101	VR	
R58	QRD167J-273	CR	
R59	QVZ3506-681	VR	
R60	QRD167J-471	CR	
R61	" -223	"	
R62	" -822	"	
R63	" -682	"	
R64	" -271	"	
R65	QVZ3506-222	VR	
R66	QRD167J-681	CR	
R67	" -822	"	
R68	" -333	"	
R69	" -223	"	
R70	" -471	"	
R71	QVZ3506-681	VR	
R72	QRD167J-273	CR	
R73	" -563	"	
R74	" -223	"	
R75	" -101	"	
R76	QVZ3506-472	VR	
R77	QRD167J-223	CR	
R78	" -223	"	
R79	" -681	"	
R80	" -222	"	
R81	" -222	"	
R82	" -682	"	
R83	" -103	"	
R84	" -221	"	
R85	" -561	"	
R86	" -561	"	
R87	QRG019J-221	OMR	
R88	QRD167J-103	CR	
R89	" -222	"	
R90	" -182	"	
R91	" -391	"	
R92	" -561	"	
R93	" -561	"	
R94	" -152	"	
R95	" -102	"	
R96	" -681	"	
R97	" -102	"	
R98	" -563	"	
R99	" -223	"	
R100	" -1R0	"	
R101	" -1R0	"	
R102	" -273	"	
R103	QVZ3506-681	VR	
R104	QRD167J-471	CR	
R105	" -223	"	
R106	" -822	"	
R107	" -681	"	
R108	" -682	"	
R109	" -271	"	
R110	QVZ3506-222	VR	
R111	QRD167J-822	CR	
R112	" -333	"	
R113	" -223	"	
R114	" -471	"	
R115	QVZ3506-681	VR	

Symbol No.	Part No.	Part Name	Description
R116	QRD167J-273	CR	
R117	" -102	"	
R118	" -472	"	
R119	" -103	"	
R120	" -223	"	
R121	" -223	"	
R122	" -123	"	
R123	" -562	"	
R124	" -392	"	
R125	" -102	"	
R126	QVZ3506-102	VR	
R127	QRD167J-102	CR	
R128	" -333	"	
R129	" -562	"	
R130	" -392	"	
R131	" -473	"	
R132	" -472	"	
R133	" -222	"	
R134	" -151	"	
R135	" -102	"	
R136	" -563	"	
R137	" -223	"	
R138	" -103	"	
R139	" -391	"	
R140	" -472	"	
R141	" -562	"	
R142	" -392	"	
R143	" -222	"	
R144	" -151	"	
R145	" -563	"	
R146	" -562	"	
R147	" -562	"	
C 1	QFN41HK-103	MY Cap	
C 2	" -333	"	
C 3	QEK41CM-476	E Cap	
C 4	QCF11EZ-223	C Cap	
C 5	QFN41HK-333	MY Cap	
C 6	" -333	"	
C 7	QCF11EZ-223	C Cap	
C 8	QEK41CM-476	E Cap	
C 9	QCF11EZ-102	C Cap	
C 10	QFN41HK-333	MY Cap	
C 11	QCF11EZ-473	C Cap	
C 12	QFN41HK-333	MY Cap	
C 13	" -333	"	
C 14	QCF11EZ-473	C Cap	
C 15	" -473	"	
C 16	QET41CM-107	E Cap	
C 17	QEK41CM-476	"	
C 18	QCF11EZ-473	C Cap	
C 19	QCS11HJ-120	"	
C 20	QFN41HK-104	MY Cap	

Symbol No.	Part No.	Part Name	Description
C21	QET41CM-107	E Cap	
C22	QCF11EZ-473	C Cap	
C23	" -473	"	
C24	" -473	"	
C25	QET41CM-107	E Cap	
C26	QCF11EZ-473	C Cap	
C27	-	-	
C28	-	-	
C29	QAT3001-009	TR Cap	
C30	" -009	"	
C31	QFN41HK-223	MY Cap	
C32	QCS11HJ-560	C Cap	
C33	QCF11EZ-223	"	
C34	QEK41CM-476	E Cap	
C35	QEK41HM-105	"	
C36	QFN41HK-223	MY Cap	
C37	" -223	"	
C38	" -223	"	
C39	" -223	"	
C40	QCS11HJ-560	C Cap	
C41	QFN41HK-223	MY Cap	
C42	" -223	"	
C43	QEK41HM-105	E Cap	
C44	QCF11EZ-223	C Cap	
C45	QEK41CM-476	E Cap	
C46	QCF11EZ-223	C Cap	
C47	QEK41CM-476	E Cap	
C48	QCF11EZ-223	C Cap	
C49	QEK41CM-476	E Cap	
C50	QCS11HJ-390	C Cap	
C51	QFN41HK-223	MY Cap	
C52	QCF11EZ-223	C Cap	
C53	" -102	"	
C54	QCS11HJ-330	"	
C55	QFN41HK-223	MY Cap	
C56	QEK41CM-476	E Cap	
C57	QEK41HM-474	"	
C58	QCF11EZ-223	C Cap	
C59	QFN41HK-223	MY Cap	
C60	QCF11EZ-223	C Cap	
C61	QEK41CM-476	E Cap	
C62	QFN41HK-223	MY Cap	
C63	" -223	"	
C64	QCS11HJ-101	C Cap	
C65	" -681	"	
C66	" -101	"	
C67	QFN41HK-223	MY Cap	
C68	" -223	"	
C69	QCF11EZ-223	C Cap	
C70	QEK41CM-476	E Cap	
C71	QCS11HJ-100	C Cap	
C72	" -100	"	
C73	QAT3001-009	TR Cap	
C74	" -009	"	
C75	QFN41HK-223	MY Cap	
C76	QCS11HJ-560	C Cap	
C77	QCF11EZ-223	"	
C78	QEK41CM-476	E Cap	
C79	QEK41HM-105	"	
C80	QFN41HK-223	MY Cap	
C81	" -223	"	
C82	" -223	"	
C83	" -332	"	
C84	QCS11HJ-560	C Cap	
C85	QFN41HK-223	MY Cap	

Symbol No.	Part No.	Part Name	Description
C86	QFN41HK-223	MY Cap	
C87	QEK41HM-105	E Cap	"
C88	QEK41CM-476	C Cap	
C89	QCF11EZ-223	MY Cap	
C90	QFN41HK-182	"	
C91	" -223	C Cap	
C92	QCS11HJ-100	E Cap	
C93	QEK41CM-476	C Cap	
C94	QCF11EZ-223	MY Cap	
C95	QFN41HK-333	"	
C96	" -333	E Cap	
C97	QEK41CM-476	C Cap	
C98	QCF11EZ-223	MY Cap	
C99	QFN41HK-333	"	
C100	QCF11EZ-223	E Cap	
C101	QEK41CM-476	C Cap	
C102	QFN41HK-333	MY Cap	
C103	" -104	"	
C104	QCS11HJ-330	C Cap	
C105	QEK41CM-476	E Cap	
C106	QCS11EZ-223	C Cap	
C107	QFN41HK-333	MY Cap	
C108	-	C Cap	
C109	QCF11EZ-223	E Cap	
C110	QEK41CM-476	MY Cap	
C111	QFN41HK-333	"	
C112	" -223	C Cap	
C113	QCF11EZ-223	"	
C114	QCF11HP-223	C Cap	
L 1	PU48530-221K	Peaking Coil	
L 2	" -221K	"	
L 3	" -101K	"	
L 4	" -470K	"	
L 5	" -101K	"	
L 6	" -150K	"	
L 7	" -150K	"	
L 8	" -221K	"	
L 9	" -221K	"	
L 10	" -221K	"	
L 11	PU30771-19	Coil	
L 12	A04725-1000	Peaking Coil	
L 13	PU48530-221K	"	
L 14	" -150K	"	
L 15	" -8R2K	"	
L 16	" -8R2K	"	
L 17	" -680K	"	
L 18	" -221K	"	
L 19	" -150K	"	
L 20	" -150K	"	
L 21	" -221K	"	
L 22	PU30771-9	Coil	
L 23	PU48530-221K	Peaking Coil	
L 24	" -221K	"	
L 25	" -221K	"	

6.2.7 Regulator Circuit Board Ass'y 07 PGE20007A

Symbol No.	Part No.	Part Name	Description
L26	PU48530-221K	Peaking Coil	
L27	" -221K	"	
LPF 1	PU48517-4	L.P.F.	
LPF 2	" -4	"	
EQ 1	PU48515-2	Equalizer	
EQ 2	" -4	"	
DL 1	PU43627B	Delay Line	
RY 1	PU46682	Relay	
RY 2	"	"	
RY 3	"	"	
CN 1	PU43351-4	Cap. Housing	
CN 2	" -3	"	
CN 3	" -7	"	
CN 4	" -5Y	"	
CN 5	" -2R	"	
CN 6	" -4	"	
CN 7	" -4R	"	
	PU53647	Shield Case (1)	
	PU53648	" (2)	
	PU53649	" (3)	
	PU21415	Center Stay	
	GBST3006Z	Th. Tap. Screw	
	PU50766	Test Pin	TP1-14

Symbol No.	Part No.	Part Name	Description
△IC 1	STR2012A	Integrated Circuit	
△IC 2	"	"	
△IC 3	"	"	
IC 4	UPC7815H	"	
IC 5	"	"	
Q 1	2SD638R	Transistor	
Q 2	2SD837Q	"	
Q 3	2SB644R	"	
D 1	RD12EB1	Zener Diode	
D 2	WO3C	Diode	
D 3	RD15EB	Zener Diode	
DA 1	RB601F	Diode Array	
DA 2	"	"	
R 1	QRD167J-271	CR	
R 2	" -182	"	
R 3	" -272	"	
R 4	" -102	"	
R 5	" -472	"	
R 6	" -222	"	
R 7	" -102	"	
R 8	QVZ3506-331	VR	
△C 1	QFH52AM-224	MM Cap	
△C 2	QEL71HR-478	E Cap	
C 3	QET41HM-107	"	
C 4	QET41AM-447	"	
C 5	QET41HM-107	"	
C 6	QET41EM-337	"	
C 7	QET41HM-107	"	
C 8	QET41EM-337	"	
C 9	" -337	"	
△C10	QEL71VR-688	"	
C11	QET41EM-337	"	

6.2.6 Full Erase Head Board 06

Symbol No.	Part No.	Part Name	Description
△	PU53259-1-2	Circuit Board	
IC 1	3VT01	Integrated Circuit	
C 1	QFP42AG-363	P Cap	

6.2.8 Syscon Circuit Board Ass'y 0 8 PGE10003A-1

Symbol No.	Part No.	Part Name	Description
△ C12	QFH52AM-224	MM Cap	
C13	-	-	
C14	QET41CM-476	E Cap	
C15	QCF11HP-223	C Cap	
C16	QET41CM-476	E Cap	
C17	QCF11HP-223	C Cap	
C18	QET41CM-476	E Cap	
C19	" -106	"	
C20	" -476	"	
△ C21	QFH52AM-224	MM Cap	
C22	QET41VM-227	E Cap	
C23	QET41EM-106	"	
C24	" -476	"	
C25	" -476	"	
C26	QET41CM-476	C Cap	
C27	QCF11HP-223	E Cap	
C28	QET41CM-227	C Cap	
C29	QCF11HP-223		
△ L 1	PGZ00027	Choke Coil	
△ L 2	"	"	
△ L 3	"	"	
△ L 4	"	"	
△ L 5	"	"	
△ L 6	"	"	
L 7	PU30284-1R	"	
	PGD40059	Heat Sink	
	SPSP3008Z	Screw	
	SPSP3006Z	"	
	PGZ00074	TR Spacer	
	PU51212	Fuse Holder	
CN 1	PU50597-3	Cap. Housing	
CN 2	" -3	"	
CN 3	" -3	"	
CN 4	PU43351-6	"	
CN 5	" -3	"	
CN 6	" -2Y	"	
CN 7	" -2R	"	
CN 8	" -2	"	
CN 9	" -4	"	
CN10	" -9	"	
CN11	" -7	"	
CN12	" -3R	"	
CN13	" -2	"	
CN14	" -2	"	
CN15	" -2	"	
CN16	" -2R	"	
CN17	" -2Y	"	
CN18	" -2	"	
	PU56008	Test Pin	TP1-9

Symbol No.	Part No.	Part Name	Description
IC 1	HD14021B	Integrated Circuit	
IC 2	"	"	
IC 3	"	"	
IC 4	"	"	
IC 5	"	"	
IC 6	"	"	
IC 7	TC4066BP	"	
△ IC 8	HD6803P	"	
IC 9	M74LS373P	"	
IC10	PGD30007-6	"	
IC11	HD6821P	"	
IC12	TD62703P	"	
IC13	M74LS20P	"	
IC14	M74LS08P	"	
IC15	M74LS04P	"	
IC16	15VT01	"	
IC17	TC4053BP	"	
IC18	"	"	
IC19	UPC1458C	"	
IC20	"	"	
IC21	UPC358C	"	
△ IC22	M54543L	"	
IC23	TC4011BP	"	
IC24	M50782SP	"	
IC25	"	"	
IC26	LM6417E-297	"	
IC27	TD62706P	"	
IC28	"	"	
IC29	"	"	
IC30	TC4011BP	"	
△ IC31	LM6416E-228	"	
IC32	M54519P	"	
IC33	"	"	
IC34	TC4081BP	"	
IC35	M54519P	"	
△ IC36	M54543L	"	
IC37	M54519P	"	
IC38	"	"	
IC39	M54533P	"	
Q 1	DTA124F	Digital Transistor	
Q 2	DTC124F	"	
Q 3	"	"	
Q 4	DTA124F	"	
Q 5	DTC124F	"	
Q 6	"	"	
Q 7	"	"	
Q 8	2SD636Q,R	Transistor	
Q 9	"	"	
Q10	DTA124F	Digital Transistor	
Q11	"	"	
Q12	"	"	
Q13	DTC124F	"	
Q14	"	"	
Q15	"	"	
Q16	DTA124F	"	

Symbol No.	Part No.	Part Name	Description
Q17	DTC124F	Digital Transistor	
Q18	DTA124F	"	
Q19	"	"	
Q20	"	"	
Q21	"	"	
Q22	"	"	
△ Q23	2SB907	Transistor	
△ Q24	"	"	
△ Q25	"	"	
△ Q26	"	"	
△ Q27	"	"	
△ Q28	"	"	
Q29	DTC124F	Digital Transistor	
Q30	"	"	
Q31	"	"	
Q32	"	"	
Q33	"	"	
Q34	"	"	
Q35	DTA124F	"	
Q36	DTC124F	"	
Q37	"	"	
D 1	RD5.1EB2	Zener Diode	
D 2	1SS133	Diode	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	-	-	
D 8	1SS133	Diode	
D 9	RD2.4EB	Zener Diode	
D10	1SS133	Diode	
D11	"	"	
D12	"	"	
D13	"	"	
D14	"	"	
D15	"	"	
D16	"	"	
D17	"	"	
D18	-	-	
D19	1SS133	Diode	
D20	"	"	
D21	"	"	
D22	"	"	
D23	"	"	
D24	"	"	
D25	"	"	
D26	"	"	
D27	"	"	
D28	"	"	
D29	"	"	
D30	"	"	
D31	"	"	
D32	RD6.2EB2	Zener Diode	
D33	RD3.0EB2	"	
D34	"	"	
D35	"	"	
D36	1SS133	Diode	
R 1	QRD167J-331	CR	
R 2	" -102	"	
R 3	" -104	"	
R 4	" -103	"	
R 5	" -103	"	

Symbol No.	Part No.	Part Name	Description
R 6	QRD167J-103	CR	
R 7	" -103	"	
R 8	" -103	"	
R 9	" -103	"	
R10	" -103	"	
R11	" -103	"	
R12	" -103	"	
R13	" -103	"	
R14	" -103	"	
R15	" -103	"	
R16	" -103	"	
R17	" -103	"	
R18	" -222	"	
R19	" -222	"	
R20	" -222	"	
R21	" -222	"	
R22	" -103	"	
R23	" -103	"	
R24	" -103	"	
R25	" -104	"	
R26	" -104	"	
R27	" -333	"	
R28	" -103	"	
R29	QRD121J-151	"	
R30	QRD167J-184	"	
R31	" -472	"	
R32	" -224	"	
R33	" -222	"	
R34	-	-	
R35	QRD167J-103	CR	
R36	-	-	
R37	QRD167J-104	CR	
R38	" -104	"	
R39	" -103	"	
R40	" -103	"	
R41	" -103	"	
R42	" -103	"	
R43	" -473	"	
R44	" -104	"	
R45	" -124	"	
R46	" -124	"	
R47	" -103	"	
R48	" -103	"	
R49	" -103	"	
R50	" -103	"	
R51	" -103	"	
R52	" -103	"	
R53	" -103	"	
R54	" -103	"	
R55	" -104	"	
R56	" -152	"	
R57	" -103	"	
R58	" -681	"	
R59	" -103	"	
R60	" -154	"	
R61	" -103	"	
R62	" -104	"	
R63	" -104	"	
R64	" -104	"	
R65	" -104	"	
R66	" -332	"	
R67	" -332	"	
R68	" -333	"	
R69	" -333	"	
R70	" -182	"	

Symbol No.	Part No.	Part Name	Description
R71	QRD167J-822	CR	
R72	" -104	"	
R73	" -104	"	
R74	QVP4A0B-223	VR	
R75	QRD167J-123	CR	
R76	" -562	"	
R77	QVP4A0B-103	VR	
R78	QRD167J-563	CR	
R79	" -391	"	
R80	" -333	"	
R81	" -333	"	
R82	" -333	"	
R83	" -333	"	
R84	" -473	"	
R85	" -104	"	
R86	" -104	"	
R87	" -104	"	
R88	-	-	-
R89	QRD167J-103	CR	
R90	" -103	"	
R91	" -103	"	
R92	" -103	"	
R93	" -472	"	
R94	" -472	"	
R95	" -472	"	
R96	" -472	"	
R97	" -472	"	
R98	" -472	"	
R99	" -472	"	
R100	" -472	"	
R101	" -472	"	
R102	" -472	"	
R103	" -472	"	
R104	" -472	"	
R105	" -472	"	
R106	" -472	"	
R107	" -472	"	
R108	" -472	"	
R109	" -472	"	
R110	" -472	"	
R111	" -472	"	
R112	" -472	"	
R113	" -472	"	
R114	" -103	"	
R115	" -104	"	
R116	" -103	"	
R117	" -473	"	
R118	" -221	"	
R119	" -221	"	
R120	" -221	"	
R121	" -222	"	
R122	" -222	"	
R123	" -222	"	
R124	" -222	"	
R125	" -222	"	
R126	" -222	"	
R127	" -222	"	
R128	" -104	"	
R129	" -684	"	
R130	" -564	"	
R131	" -104	"	
R132	" -105	"	
R133	" -473	"	
R134	" -104	"	
R135	" -104	"	

Symbol No.	Part No.	Part Name	Description
R136	QRD167J-222	CR	
R137	" -222	"	
R138	" -222	"	
R139	" -222	"	
R140	" -222	"	
R141	" -222	"	
R142	" -222	"	
R143	" -222	"	
R144	" -222	"	
R145	" -473	"	
R146	" -473	"	
R147	" -473	"	
R148	" -473	"	
R149	" -473	"	
R150	" -473	"	
R151	" -681	"	
R152	" -272	"	
R153	-	-	-
R154	QRD167J-473	CR	
R155	" -103	"	
R156	" -103	"	
R157	" -222	"	
R158	" -473	"	
R159	" -104	"	
R160	" -104	"	
R161	" -333	"	
R162	" -472	"	
R163	" -103	"	
R164	" -103	"	
R165	" -472	"	
R166	" -154	"	
R167	" -103	"	
R168	" -103	"	
R169	" -103	"	
R170	" -104	"	
R171	" -103	"	
R172	" -104	"	
R173	" -104	"	
R174	" -223	"	
C 1	QET41EM-476	E Cap	
C 2	QET41CM-476	"	
C 3	" -476	"	
C 4	" -226	"	
C 5	QFN41HK-103	MY Cap	
C 6	" -103	"	
C 7	" -103	"	
C 8	" -103	"	
C 9	" -103	"	
C10	-	-	-
C11	QFN41HK-154	MY Cap	
C12	" -103	"	
C13	QET41EM-475	E Cap	
C14	QET41HM-225	"	
C15	QCF11HP-473	C Cap	
C16	QCS11HJ-220	"	
C17	" -220	"	
C18	QCF11HP-473	"	
C19	" -473	"	
C20	" -473	"	
C21	" -473	"	
C22	QFN41HK-103	MY Cap	
C23	QET41HM-105	E Cap	
C24	-	-	-
C25	QCF11HP-473	C Cap	

Symbol No.	Part No.	Part Name	Description
C26	QFN41HK-104	MY Cap	
C27	QCS11HJ-101	C Cap	
C28	QCF11HP-472	"	
C29	" -472	"	
C30	" -472	"	
C31	" -473	"	
C32	QCS11HJ-101	"	
C33	" -101	"	
C34	QET41CM-476	E Cap	
C35	QCS11HJ-221	C Cap	
C36	QET41CM-106	E Cap	
C37	" -106	"	
C38	" -106	"	
C39	QET41HK-105	"	
C40	" -105	"	
C41	QCF41HK-223	C Cap	
C42	" -223	"	
C43	QFN41HK-154	MY Cap	
RA 1	EXB-P88104M	Resistor Array	
RA 2	"	"	
RA 3	"	"	
RA 4	EXB-P84104M	"	
RA 5	EXB-P88103M	"	
RA 6	EXB-P84104M	"	
RA 7	"	"	
RA 8	"	"	
S 1	PU52746-104	Dip Switch	
S 2	" -108	"	
S 3	" -104	"	
△ X 1	PU30832M	Crystal	
△ CF 1	PU54060	Ceramic Filter	
	PGZ00003	IC Socket	or PGZ00083
	PGD30111	Sys. PWB Stay (1)	
	PGD30112	" (2)	
	GBST3006Z	Th. Tap. Screw	
	PU54969-2	Wire Clamp	
CN 1	PU43351-4	Cap. Housing	
CN 2	" -9	"	
CN 3	" -8R	"	
CN 4	" -11Y	"	
CN 5	" -2	"	
CN 6	" -2R	"	
CN 7	" -6	"	
CN 8	" -3	"	
CN 9	" -9	"	
CN10	" -7	"	
CN11	" -10	"	
CN12	" -9R	"	
CN13	" -9	"	
CN14	" -12	"	
CN15	" -3	"	

Symbol No.	Part No.	Part Name	Description
CN16	PU43351-7	Cap. Housing	
CN17	" -8	"	
CN18	" -6	"	
CN19	" -3	"	
CN20	" -3R	"	
CN21	" -3Y	"	
CN22	" -3	"	
CN23	" -2	"	
CN24	" -12R	"	
CN25	" -2	"	
CN26	" -7	"	
CN27	" -9Y	"	
CN28	" -6	"	
CN29	" -7	"	
	PU50766	Test Pin	TP1-4

6.2.9 Operation Board 10

Symbol No.	Part No.	Part Name	Description
△	PGE20010-1-1	Circuit Board	
D 1	GL-3PR2	L.E.D.	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	"	"	
D13	-	-	-
D14	GL-3PR2	L.E.D.	-
R 1	ORD167J-331	CR	
R 2	" -331	"	
R 3	" -331	"	
R 4	" -331	"	
R 5	" -331	"	
R 6	" -331	"	
R 7	" -331	"	
R 8	" -331	"	
R 9	" -331	"	
R10	" -331	"	
R11	" -331	"	
R12	" -331	"	
R13	" -331	"	
R14	" -331	"	
S 1	PU49344	Push Switch	
S 2	"	"	
S 3	"	"	
S 4	"	"	
S 5	"	"	
S 6	"	"	
S 7	"	"	
S 8	"	"	
S 9	"	"	
S10	"	"	
S11	"	"	
S12	"	"	
S13	"	"	
S14	"	"	
S15	"	"	
	PU52848-1-2	LED Spacer	
CN 1	PU49215-107	Cap. Housing	
CN 2	" -108R	"	
CN 3	" -109Y	"	
CN 4	" -109	"	

6.2.10 Junction Circuit Board Ass'y 11 PGE30002A

Symbol No.	Part No.	Part Name	Description
IC 1	HD14021B	Integrated Circuit	
IC 2	"	"	
D 1	VO3C	Diode	
D 2	"	"	
DA 1	UPA64H	Diode Array	
DA 2	UPA54H	"	
R 1	ORD167J-103	CR	
R 2	" -103	"	
R 3	" -103	"	
R 4	" -103	"	
R 5	" -103	"	
R 6	" -103	"	
R 7	" -103	"	
R 8	" -103	"	
R 9	" -103	"	
R10	" -103	"	
R11	" -103	"	
R12	" -103	"	
R13	" -103	"	
R14	" -103	"	
R15	" -103	"	
R16	" -103	"	
R17	" -101	"	
R18	" -101	"	
R19	" -101	"	
R20	" -101	"	
R21	" -101	"	
R22	" -101	"	
R23	" -101	"	
R24	" -101	"	
R25	" -101	"	
R26	" -101	"	
R27	" -101	"	
R28	" -101	"	
R29	" -101	"	
R30	" -101	"	
R31	" -101	"	
R32	" -101	"	
R33	" -101	"	
R34	" -101	"	
R35	" -101	"	
R36	" -101	"	
RA 1	EXB-P88104M	Resistor Array	
RA 2	"	"	

6.2.11 Rear Board

Symbol No.	Part No.	Part Name	Description
C 1	QET41AM-107	E Cap	
C 2	QET41CM-227	"	
C 3	" -227	"	
C 4	QCF11HP-472	C Cap	
C 5	" 472	"	
VA 1 -43	PU49624-2	Varistor	
CN 1	PU49215-11Y	Cap. Housing	
CN 2	" -2	"	
CN 3	" -11R	"	
CN 4	" -12R	"	
CN 5	" -12Y	"	
CN 6	" -12	"	
CN 7	" -12	"	
CN 8	" -10	"	

Symbol No.	Part No.	Part Name	Description
△	PGE20011	Circuit Board	
Q 1	DTC124F	Digital Transistor	
R 1	QRD187J-101	CR	
R 2	" -750	"	
R 3	" -750	"	
R 4	" -103	"	
R 5	" -153	"	
R 6	" -122	"	
R 7	" -103	"	
R 8	" -153	"	
R 9	" -122	"	
R10	" -750	"	
CN 8	PU43351-102	Cap. Housing	

6.2.12 Counter Circuit Board Ass'y 16 PGE30003A1

Symbol No.	Part No.	Part Name	Description
△ IC 1	UPD554C-058	Integrated Circuit	
△ IC 2	UPD550C-055	"	
IC 3	TC4029BP	"	
Q 1	DTC124F	Digital Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	"	"	
Q 5	DTA124F	"	
Q 6	"	"	
Q 7	2SB739B,C	Transistor	
Q 8	DTC124F	Digital Transistor	
D 1	1SS133	Diode	
D 2	"	"	
D 3	RD5.6EB2	Zener Diode	
D 4	RD8.2EB2	"	
D 5	1SS133	Diode	
R 1	QRD167J-333	CR	
R 2	" -333	"	
R 3	" -104	"	
R 4	" -222	"	
R 5	" -222	"	
R 6	" -222	"	
R 7	" -333	"	
R 8	" -333	"	
R 9	-	-	
R10	QRD167J-104	CR	
R11	" -105	"	
R12	" -103	"	
R13	" -104	"	
R14	" -332	"	
R15	" -333	"	
R16	" -104	"	
R17	" -104	"	
R18	" -105	"	
R19	" -333	"	
R20	" -563	"	
R21	" -391	"	
R22	" -333	"	
R23	" -333	"	
R24	" -473	"	
R25	QRD121J-470	"	
R26	QRD167J-333	"	
R27	-	-	
R28	QRD167J-104	CR	
R29	" -333	"	

Symbol No.	Part No.	Part Name	Description
RA 1	EXB-P84104M	Resistor Array	
RA 2	EXB-P88334M	"	
RA 3	"	"	
C 1	QFN41HK-562	MY Cap	
C 2	QCS11HJ-471	C Cap	
C 3	" -121	"	
C 4	QCF11HP-473	"	
C 5	" -473	"	
C 6	QCS11HJ-471	"	
C 7	" -121	"	
C 8	QFN41HK-392	MY Cap	
C 9	" -392	"	
C10	QEK41HM-474	E Cap	
C11	QET41CM-227	"	
C12	" -227	"	
C13	" -106	"	
C14	" -106	"	
T 1	PGZ00002	Heater Trans.	
CF 1	PU50224	Ceramic Filter	
CF 2	"	"	
CN 1	PU43351-8	Cap. Housing	
CN 2	" -3R	"	

6.2.13 Head Circuit Board Ass'y 19 PGE40003A

Symbol No.	Part No.	Part Name	Description
CN 1	PU43351-103	Cap. Housing	
CN 2	" -103R	"	
CN 3	" -103	"	
CN 4	" -103Y	"	

6.2.14 Reel Servo Circuit Board Ass'y 20 PU50644C

Symbol No.	Part No.	Part Name	Description
IC 1	UPC324C	Integrated Circuit	
IC 2	TC4066BP	"	
IC 3	TC4071BP	"	
IC 4	TC4069UBP	"	
IC 5	TA7140P	"	
IC 6	HA17555PS	"	
IC 7	M51207L	"	
IC 8	UPC324C	"	
IC 9	TC4066BP	"	
IC10	LM2907N-8	"	
IC11	UPC324C	"	
IC12	M51207L	"	
IC13	LM2907N-8	"	
IC14	TC4066BP	"	
IC15	HA17555PS	"	
Q 1	2SD636R,S	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	-	-	
Q 5	2SD636R,S	Transistor	
Q 6	2SB641R,S	"	
Q 7	2SD636R,S	"	
Q 8	-	-	
Q 9	2SD636R,S	Transistor	
Q10	2SB751Q	"	
Q11	2SD636R,S	"	
Q12	"	"	
Q13	"	"	
Q14	"	"	
Q15	2SB751Q	"	
Q16	2SD636R,S	"	
Q17	-	-	
Q18	2SD636R,S	Transistor	
Q19	"	"	
Q20	2SB641R,S	"	
Q21	2SD636R,S	"	
Q22	2SD837Q	"	
Q23	"	"	
Q24	2SD636R,S	"	
Q25	"	"	
Q26	2SB641R,S	"	
Q27	2SD636R,S	"	
Q28	"	"	
Q29	"	"	
Q30	"	"	

Symbol No.	Part No.	Part Name	Description
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	U05E	"	
D 5	1SS133	"	
D 6	U05E	"	
D 7	1SS133	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
R 1	QVP4A0B-102	VR	
R 2	QRD167J-561	CR	
R 3	" -103	"	
R 4	" -103	"	
R 5	" -333	"	
R 6	" -103	"	
R 7	" -124	"	
R 8	" -472	"	
R 9	" -682	"	
R10	" -222	"	
R11	" -104	"	
R12	QRV143F-5361	MFR	
R13	QRD167J-124	CR	
R14	QRV143F-4641	MFR	
R15	QRD167J-105	CR	
R16	" -103	"	
R17	QRD187J-224	"	
R18	QRD167J-103	"	
R19	QRV143F-5361	MFR	
R20	" -5361	"	
R21	QRD167J-103	CR	
R22	" -103	"	
R23	-	-	-
R24	-	-	-
R25	-	-	-
R26	QRD167J-104	CR	
R27	" -224	"	
R28	" -472	"	
R29	QVP4A0B-102	VR	
R30	QRD167J-682	CR	
R31	" -472	"	
R32	QVP4A0B-102	VR	
R33	QRD167J-472	CR	
R34	QRD187J-103	"	
R35	QRD167J-103	"	
R36	" -473	"	
R37	" -104	"	
R38	" -224	"	
R39	" -103	"	
R40	" -103	"	
R41	" -103	"	
R42	" -102	"	
R43	" -331	"	
R44	" -471	"	
R45	QVP4A0B-221	VR	

Symbol No.	Part No.	Part Name	Description
R46	QRD167J-561	CR	
R47	" -563	"	
R48	" -103	"	
R49	" -223	"	
R50	-	-	-
R51	QRD167J-224	CR	
R52	" -473	"	
R53	" -392	"	
R54	" -223	"	
R55	" -103	"	
R56	" -103	"	
R57	" -394	"	
R58	" -105	"	
R59	" -103	"	
R60	" -103	"	
R61	" -224	"	
R62	" -103	"	
R63	" -103	"	
R64	" -103	"	
R65	" -562	"	
R66	" -223	"	
R67	QRD187J-223	"	
R68	QRD167J-104	"	
R69	" -473	"	
R70	" -104	"	
R71	" -103	"	
R72	QVP4A0B-102	VR	
R73	QRD167J-122	CR	
R74	" -103	"	
R75	" -104	"	
R76	" -103	"	
R77	" -103	"	
R78	" -104	"	
R79	QRV143F-5623	MFR	
R80	QRD167J-103	CR	
R81	" -224	"	
R82	" -104	"	
R83	" -103	"	
R84	" -332	"	
R85	" -681	"	
R86	" -392	"	
R87	" -333	"	
R88	" -473	"	
R89	" -104	"	
R90	" -562	"	
R91	" -103	"	
R92	" -223	"	
R93	" -103	"	
R94	" -103	"	
R95	" -394	"	
R96	" -105	"	
R97	QRD187J-103	"	
R98	QRD167J-103	"	
R99	" -103	"	
R100	" -103	"	
R101	" -103	"	
R102	" -562	"	
R103	" -223	"	
R104	" -223	"	
R105	" -104	"	
R106	" -473	"	
R107	" -104	"	
R108	" -103	"	
R109	QVP4A0B-102	VR	
R110	QRD167J-122	CR	

Symbol No.	Part No.	Part Name	Description
R111	QRD167J-103	CR	
R112	" -104	"	
R113	" -103	"	
R114	" -103	"	
R115	" -104	"	
R116	ORV143F-5623	MFR	
R117	QRD167J-103	CR	
R118	" -224	"	
R119	" -104	"	
R120	" -103	"	
R121	" -332	"	
R122	" -681	"	
R123	" -392	"	
R124	" -333	"	
R125	" -473	"	
R126	" -104	"	
R127	" -562	"	
R128	QVP4A0B-334	VR	
R129	QRD167J-105	CR	
R130	" -104	"	
R131	" -104	"	
R132	QRD187J-103	"	
R133	QRD167J-104	"	
R134	" -824	"	
R135	QRD187J-103	"	
R136	QRD167J-103	"	
R137	" -103	"	
R138	" -472	"	
R139	QVP4A0B-102	VR	
R140	QRD167J-682	CR	
R141	QRD187J-472	"	
R142	QVP4A0B-102	VR	
R143	QRD167J-472	CR	
R144	" -272	"	
R145	QVP4A0B-102	VR	
R146	QRD167J-392	CR	
R147	" -473	"	
R148	" -333	"	
R149	-	-	
R150	QRX019J-R47S	MFR	
R151	QRD167J-473	CR	
R152	" -333	"	
R153	-	-	
R154	QRX019J-R47S	MFR	
R155	QRD167J-223	CR	
R156	-	-	
R157	-	-	
R158	-	-	
R159	QRD121J-681	CR	
R160	-	-	
R161	QRD187J-224	CR	
R162	QRD167J-224	"	
R163	" -274	"	
R164	" -394	"	
R165	" -104	"	
R166	" -102	"	
R167	QVP4A0B-102	VR	
R168	QRD167J-103	CR	
R169	" -562	"	
R170	QVP4A0B-102	VR	
R171	QRD167J-472	CR	
R172	" -563	"	
R173	" -104	"	
R174	" -104	"	
R175	" -224	"	

Symbol No.	Part No.	Part Name	Description
R176	QRD167J-224	CR	
R177	" -823	"	
R178	" -224	"	
R179	" -103	"	
R180	-	-	
R181	-	-	
R182	QRD167J-105	CR	
R183	QVP4A0B-104	VR	
RA 1	EXB-P85224M	Resistor Array	
RA 2	"	"	
C 1	QET41CM-107	E Cap	
C 2	QCF11HP-103	C Cap	
C 3	QET41HM-105	E Cap	
C 4	QET41CM-106	"	
C 5	QFN41HK-124	MY Cap	
C 6	QET41CM-106	E Cap	
C 7	QFN41HK-123	MY Cap	
C 8	-	-	
C 9	QFN41HK-153	MY Cap	
C10	QET41CM-227	E Cap	
C11	" -227	"	
C12	" -106	"	
C13	" -106	"	
C14	" -106	"	
C15	QFN41HK-473	MY Cap	
C16	QET41CM-106	E Cap	
C17	QFN41HK-103	MY Cap	
C18	" -103	"	
C19	QET41CM-476	E Cap	
C20	QCF11HP-103	C Cap	
C21	QET41CM-106	E Cap	
C22	" -106	"	
C23	QFN41HK-223	MY Cap	
C24	QET41CM-106	E Cap	
C25	" -476	"	
C26	-	-	
C27	QFN41HK-563	MY Cap	
C28	" -223	"	
C29	QET41CM-106	E Cap	
C30	QCF11HP-103	C Cap	
C31	QET41CM-107	E Cap	
C32	QFN41HK-103	MY Cap	
C33	" -122	"	
C34	" -273	"	
C35	QCF11HP-103	C Cap	
C36	QET41EM-107	E Cap	
C37	QCS11HJ-5R0	C Cap	
C38	QET41EM-107	E Cap	
C39	-	-	
C40	QET41ER-477	E Cap	

Symbol No.	Part No.	Part Name	Description
C41	QCF11HP-223	C Cap	
C42	QET41CM-106	E Cap	
C43	" -106	"	
C44	" -107	"	
C45	QET41HM-105	"	
C46	QFN41HK-182	MY Cap	
C47	" -122	"	
C48	" -104	"	
C49	QET41CM-106	E Cap	
C50	QFN41HK-102	MY Cap	
C51	" -273	"	
C52	QCF11HP-103	C Cap	
C53	QET41EM-107	E Cap	
C54	-	-	
C55	QET41EM-107	E Cap	
C56	QCF11HP-223	C Cap	
C57	QET41ER-477	E Cap	
C58	QCF11HP-223	C Cap	
C59	QET41CM-106	E Cap	
C60	-	-	
C61	QET41CM-107	E Cap	
C62	QET41HM-105	"	
C63	QFN41HK-182	MY Cap	
C64	" -122	"	
C65	" -104	"	
C66	QET41CM-106	E Cap	
C67	QFN41HK-102	MY Cap	
C68	QET41EM-476	E Cap	
C69	QEE41CM-225	T Cap	
C70	QFN41HK-103	MY Cap	
C71	QCF11HP-103	C Cap	
C72	QET41CM-107	E Cap	
C73	QFN41HK-103	MY Cap	
C74	QET41HM-105	E Cap	
C75	QET41CM-107	"	
C76	QCF11HP-103	C Cap	
C77	QET41CM-106	E Cap	
C78	" -106	"	
C79	" -106	"	
C80	" -227	"	
C81	QCF11HP-223	C Cap	
C82	QET41EM-227	E Cap	
C83	QCF11HP-223	C Cap	
C84	QET41EM-106	E Cap	
C85	" -106	"	
C86	QFN41HK-103	MY Cap	
C87	" -333	"	
C88	QET41CM-107	E Cap	
C89	" -106	"	
C90	QFN41HK-103	MY Cap	
C91	" -103	"	
C92	" -102	"	
C93	" -102	"	

Symbol No.	Part No.	Part Name	Description
L 1	A04725-270	Peaking Coil	
L 2	" -270	"	
L 3	PU44041-104	Choke Coil	
L 4	A04725-270	Peaking Coil	
△ L 5	" -270	"	
L 6	PU50755	Choke Coil	
L 7	A04725-270	Peaking Coil	
△ L 8	" -270	"	
L 9	PU50755	Choke Coil	
L 10	A04725-270	Peaking Coil	
L 11	" -270	"	
L 12	" -270	"	
L 13	" -270	"	
L 14	" -270	"	
△ L 15	PU50277	Inductor	
J201	PU50715-6	Female Conn.	
J202	" -18	"	
J203	" -16	"	
	PU32908	Servo PWB Stay	
	GBST3006ZS	Tapping Screw	
	PU41624-6	Isolation Washer	
	DPSP3008ZS	Screw	
	GBST3006ZS	Tapping Screw	
	PU33642	Shield Case	
	PU33644	S. Heat Sink (1)	
	PU50718	" (2)	
	PU45375	TR. Spacer	
	PU45908	Test Pin	TP1-19

6.2.15 Capstan Servo Circuit Board Ass'y [2][1]
..... PU50645B

Symbol No.	Part No.	Part Name	Description
IC 1	UPC1458C	Integrated Circuit	
IC 2	LM2907N-8	"	
IC 3	UPC1458C	"	
IC 4	UPC358C	"	
IC 5	UPC78M10H	"	
IC 6	AN360	"	
IC 7	LM2907N-8	"	
IC 8	TC4030BP	"	
IC 9	TC4011BP	"	
IC10	"	"	
IC11	TC4027BP	"	
IC12	HA17555PS	"	
IC13	TC4555BP	"	
IC14	TC4017BP	"	
IC15	HA17555PS	"	
IC16	LM2907N-8	"	
IC17	UPC358C	"	
IC18	AN6341N	"	
IC19	TC4066BP	"	
IC20	UPC358C	"	
IC21	TC4011BP	"	
IC22	"	"	
Q 1	2SD636R,S	Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	2SB641R,S	"	
Q 5	2SD636R,S	"	
Q 6	"	"	
Q 7	"	"	
Q 8	2SK30A-O	F.E.T.	
Q 9	2SB641R,S	Transistor	
Q10	2SC732BL	"	
Q11	2SD636R,S	"	
Q12	"	"	
Q13	"	"	
Q14	2SB641R,S	"	
Q15	2SD636R,S	"	
Q16	"	"	
Q17	"	"	
Q18	"	"	
Q19	2SC1983R	"	
Q20	2SB751Q	"	
Q21	2SC1983R	"	
Q22	2SD639R,S	"	
Q23	2SD636R,S	"	
Q24	2SC1983R	"	
Q25	2SB751Q	"	
Q26	2SC1983R	"	
Q27	2SD639R,S	"	

Symbol No.	Part No.	Part Name	Description
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	RD4.7EB2	Zener Diode	
R 1	QRD167J-101	CR	
R 2	" -103	"	
R 3	QVP4A0B-103	VR	
R 4	QRD167J-103	CR	
R 5	" -563	"	
R 6	" -153	"	
R 7	" -153	"	
R 8	" -224	"	
R 9	" -472	"	
R10	" -472	"	
R11	" -152	"	
R12	" -223	"	
R13	" -103	"	
R14	QRV143F-1403	MFR	
R15	QRD167J-472	CR	
R16	QRV143F-1003	MFR	
R17	" -2611	"	
R18	QVP4A0B-102	VR	
R19	QRV143F-3921	MFR	
R20	" -3162	"	
R21	QRD167J-392	CR	
R22	QVP4A0B-102	VR	
R23	QRD167J-332	CR	
R24	QRV143F-1002	MFR	
R25	" -1102	"	
R26	QRD167J-103	CR	
R27	" -103	"	
R28	" -103	"	
R29	" -104	"	
R30	" -224	"	
R31	" -154	"	
R32	" -153	"	
R33	" -221	"	
R34	" -102	"	
R35	" -104	"	
R36	" -104	"	
R37	" -105	"	
R38	" -104	"	
R39	" -472	"	
R40	QVP4A0B-222	VR	
R41	QRD167J-562	CR	
R42	" -152	"	
R43	-	-	

Symbol No.	Part No.	Part Name	Description
R44	QRD167J-103	CR	
R45	" -473	"	
R46	" -393	"	
R47	" -564	"	
R48	" -121	"	
R49	" -272	"	
R50	" -392	"	
R51	" -103	"	
R52	QRV143F-5623	MFR	
R53	" -1183	"	
R54	QRD167J-103	CR	
R55	QRV143F-1212	MFR	
R56	QRD167J-333	CR	
R57	QRV143F-6811	MFR	
R58	QRD167J-393	CR	
R59	" -102	"	
R60	" -332	"	
R61	" -103	"	
R62	QVP4A0B-222	VR	
R63	QRD167J-332	CR	
R64	" -223	"	
R65	" -104	"	
R66	" -104	"	
R67	" -473	"	
R68	" -104	"	
R69	" -103	"	
R70	" -104	"	
R71	" -103	"	
R72	" -473	"	
R73	" -104	"	
R74	" -223	"	
R75	QRD187J-333	"	
R76	QRD167J-472	"	
R77	" -472	"	
R78	" -224	"	
R79	-	-	
R80	ORD167J-332	CR	
R81	" -473	"	
R82	" -333	"	
R83	" -182	"	
R84	" -333	"	
R85	" -474	"	
R86	" -472	"	
R87	" -103	"	
R88	" -223	"	
R89	" -104	"	
R90	QVP4A0B-224	VR	
R91	QRD167J-334	CR	
R92	" -104	"	
R93	" -472	"	
R94	" -103	"	
R95	QRV143F-1693	MFR	
R96	QRD167J-103	CR	
R97	QRV143F-1153	MFR	
R98	" -1153	"	
R99	" -5762	"	
R100	QRD167J-104	CR	
R101	" -103	"	
R102	" -103	"	
R103	" -104	"	
R104	" -123	"	
R105	" -472	"	
R106	QVP4A0B-102	VR	
R107	QRD167J-472	CR	
R108	" -104	"	

Symbol No.	Part No.	Part Name	Description
R109	QRD167J-223	CR	
R110	" -104	"	
R111	" -473	"	
R112	QVZ3501-224	VR	
R113	QRD167J-184	CR	
R114	" -683	"	
R115	" -104	"	
R116	" -103	"	
R117	" -102	"	
R118	QRV143F-1502	MFR	
R119	QRD167J-102	CR	
R120	ORD187J-105	"	
R121	QRD167J-154	"	
R122	QRV143F-1272	MFR	
R123	" -1002	"	
R124	QRD167J-105	CR	
R125	" -224	"	
R126	QRV143F-5621	MFR	
R127	" -6041	"	
R128	QRD167J-222	CR	
R129	" -104	"	
R130	QRV143F-6811	MFR	
R131	" -3481	"	
R132	-	-	
R133	QRD167J-104	CR	
R134	" -332	"	
R135	" -103	"	
R136	" -273	"	
R137	" -223	"	
R138	" -223	"	
R139	" -104	"	
R140	" -103	"	
R141	" -103	"	
R142	" -223	"	
R143	" -105	"	
R144	" -563	"	
R145	" -473	"	
R146	" -104	"	
R147	QRZ0054-150	FR	
R148	QRD167J-222	CR	
R149	" -333	"	
R150	" -333	"	
R151	" -102	"	
R152	" -472	"	
R153	" -333	"	
R154	" -473	"	
R155	" -103	"	
R156	" -222	"	
R157	" -333	"	
R158	" -333	"	
R159	" -102	"	
R160	" -472	"	
R161	" -333	"	
R162	" -473	"	
R163	" -103	"	
R164	" -103	"	
R165	" -224	"	
R166	" -822	"	
R167	" -103	"	
R168	" -822	"	
R169	" -222	"	
R170	"		

Symbol No.	Part No.	Part Name	Description
RA 1	EXB-P85224M		
RA 2	"	Resistor Array	"
C 1	QET41CM-107	E Cap	
C 2	" -476	"	
C 3	QEE41CM-226	T Cap	
C 4	QET41CM-106	E Cap	
C 5	QEE41CM-226	T Cap	
C 6	QFP42AF-102M	PP Cap	
C 7	QFN41HK-104	MY Cap	
C 8	QET41CM-106	E Cap	
C 9	QFN41HK-472	MY Cap	
C10	QET41CM-106	E Cap	
C11	-	-	-
C12	QEE41CM-106	T Cap	
C13	QFN41HK-104	MY Cap	
C14	" -103	"	
C15	QET41CM-106	E Cap	
C16	" -107	"	
C17	QCF11HP-103	C Cap	
C18	QCS11HK-330	"	
C19	QET41CM-476	E Cap	
C20	QCF11HP-103	C Cap	
C21	QEE41CM-106	T Cap	
C22	-	-	-
C23	QET41CM-107	E Cap	
C24	QEE41CM-106	T Cap	
C25	" -106	"	
C26	QET41CM-476	E Cap	
C27	QFN41HK-332	MY Cap	
C28	QEE41CM-106	T Cap	
C29	QCS11HK-471	C Cap	
C30	-	-	-
C31	QEE41CM-226	T Cap	
C32	QFP42AF-162M	PP Cap	
C33	QFN41HK-104	MY Cap	
C34	QET41CM-106	E Cap	
C35	QFM41HJ-152M	MY Cap	
C36	QFN41HK-152	"	
C37	" -102	"	
C38	" -103	"	
C39	QCF11HP-103	C Cap	
C40	QET41EM-107	E Cap	
C41	" -476	"	
C42	QFN41HK-103	MY Cap	
C43	QFM41HJ-333M	"	
C44	QET41CM-476	E Cap	
C45	" -106	"	

Symbol No.	Part No.	Part Name	Description
C46	QET41CM-107	E Cap	
C47	QFN41HK-102	MY Cap	
C48	QCF11HP-103	C Cap	
C49	QET41CM-107	E Cap	
C50	QFN41HK-103	MY Cap	
C51	QFM41HJ-103M	"	
C52	QFN41HK-333	"	
C53	QET41CM-107	E Cap	
C54	QCF11HP-103	C Cap	
C55	QEE41CM-226	T Cap	
C56	QFP42AF-272M	PP Cap	
C57	QFN41HK-333	MY Cap	
C58	QFP42AF-122M	PP Cap	
C59	" -122M	"	
C60	" -242M	"	
C61	QET41CM-106	E Cap	
C62	QFN41HK-472	MY Cap	
C63	QET41CM-106	E Cap	
C64	QFN41HK-472	MY Cap	
C65	QFM41HJ-473M	"	
C66	QFN41HK-332	"	
C67	QFP42AF-154M	PP Cap	
C68	QFN41HK-104	MY Cap	
C69	QEE41CM-106	T Cap	
C70	QET41CM-227	E Cap	
C71	QCF11HP-103	C Cap	
C72	-	-	-
C73	QET41EM-476	E Cap	
C74	QCF11HP-103	C Cap	
C75	QEE41EM-475	T Cap	
C76	" -475	"	
C77	QFN41HK-103	MY Cap	
C78	QCF11HP-102	C Cap	
C79	QET41HM-475	E Cap	
C80	QCF11HP-102	C Cap	
C81	QET41HM-475	E Cap	
C82	QET41CM-476	"	
C83	QCF11HP-103	C Cap	
C84	QET41CM-107	E Cap	
C85	QCF11HP-103	C Cap	
C86	QET41EM-107	E Cap	
C87	-	-	-
C88	QET41CM-106	E Cap	
C89	QFN41HK-152	MY Cap	
C90	QET41CM-476	E Cap	
C91	QFN41HK-103	MY Cap	
C92	" -103	"	
C93	" -393	"	
C94	QCF11HP-223	C Cap	
C95	QFM41HJ-222M	MY Cap	

6.2.16 Drum Servo Circuit Board Ass'y [2][2]
PGE20012A

Symbol No.	Part No.	Part Name	Description
L 1	PU48530-271K	Peaking Coil	
L 2	" -271K	"	
L 3	-	-	
L 4	PU48530-271K	Peaking Coil	
L 5	" -271K	"	
L 6	" -271K	"	
L 7	" -271K	"	
L 8	" -271K	"	
L 9	" -271K	"	
J211	PU50715-6	Female Conn.	
J212	" -18	"	
J213	" -18	"	
	PU32908 GBST3006ZS	Servo PWB Stay Th. Tap. Screw	
	PU45908	Test Pin	TP1-10, 12-27

Symbol No.	Part No.	Part Name	Description
IC 1	AN301	Integrated Circuit	
IC 2	TC4011BP	"	
IC 3	"	"	
△ IC 4	AN6342N	"	
IC 5	AN301	"	
IC 6	TC4538BP	"	
IC 7	-	"	
IC 8	AN6344	Integrated Circuit	
IC 9	UPC1458C	"	
IC10	NJM2903D	"	
IC11	HA13008	"	
IC12	TC4069UBP	"	
IC13	TC4011BP	"	
IC14	-	"	
IC15	-	"	
IC16	TC4001BP	Integrated Circuit	
IC17	TC4066BP	"	
IC18	"	"	
Q 1	2SC1545B	Transistor	
Q 2	"	"	
Q 3	2SD636R,S	"	
Q 4	"	"	
Q 5	"	"	
Q 6	"	"	
Q 7	2SB641R,S	"	
Q 8	"	"	
Q 9	2SD636R,S	"	
Q10	"	"	
Q11	"	"	
Q12	"	"	
Q13	2SB641R,S	"	
Q14	2SD636R,S	"	
Q15	"	"	
Q16	2SK30A-0	F.E.T.	
Q17	-	"	
Q18	2SK30A-0	F.E.T.	
Q19	2SD636R,S	Transistor	
Q20	"	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	

Symbol No.	Part No.	Part Name	Description
D 6	1SS133	Diode	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	"	"	
D12	"	"	
D13	"	"	
D14	"	"	
D15	"	"	
D16	"	"	
D17	"	"	
D18	"	"	
R 1	QRD167J-152	CR	
R 2	" -684	"	
R 3	" -103	"	
R 4	" -104	"	
R 5	" -103	"	
R 6	" -103	"	
R 7	" -563	"	
R 8	" -223	"	
R 9	" -153	"	
R10	" -563	"	
R11	" -223	"	
R12	" -153	"	
R13	" -682	"	
R14	" -153	"	
R15	" -153	"	
R16	" -104	"	
R17	" -102	"	
R18	" -563	"	
R19	" -104	"	
R20	" -473	"	
R21	" -473	"	
R22	" -563	"	
R23	" -223	"	
R24	" -563	"	
R25	" -473	"	
R26	" -473	"	
R27	" -223	"	
R28	" -332	"	
R29	" -563	"	
R30	" -472	"	
R31	" -221	"	
R32	" -390	"	
R33	" -390	"	
R34	" -273	"	
R35	" -152	"	
R36	" -103	"	
R37	" -103	"	
R38	" -474	"	
R39	" -564	"	
R40	" -103	"	

Symbol No.	Part No.	Part Name	Description
R41	QRD167J-223	CR	
R42	" -104	"	
R43	" -102	"	
R44	" -563	"	
R45	" -104	"	
R46	" -473	"	
R47	" -103	"	
R48	QRV143F-3572	MFR	
R49	QRD167J-105	CR	
R50	" -103	"	
R51	" -103	"	
R52	" -223	"	
R53	" -104	"	
R54	" -103	"	
R55	" -564	"	
R56	" -103	"	
R57	QVP9A0B-103	VR	
R58	QRV143F-8062	MFR	
R59	QRD167J-104	CR	
R60	" -223	"	
R61	" -104	"	
R62	" -103	"	
R63	" -103	"	
R64	" -104	"	
R65	" -104	"	
R66	" -223	"	
R67	" -104	"	
R68	" -103	"	
R69	" -331	"	
R70	" -473	"	
R71	" -103	"	
R72	" -823	"	
R73	" -224	"	
R74	" -332	"	
R75	" -823	"	
R76	" -103	"	
R77	" -272	"	
R78	" -271	"	
R79	" -103	"	
R80	" -394	"	
R81	" -472	"	
R82	" -564	"	
R83	" -105	"	
R84	" -105	"	
R85	QVP9A0B-473	VR	
R86	QRD167J-223	CR	
R87	QVP9A0B-473	VR	
R88	QRD167J-223	CR	
R89	QVP9A0B-154	VR	
R90	QRD167J-124	CR	
R91	" -563	"	
R92	" -474	"	
R93	QRV143F-1782	MFR	
R94	QRD167J-101	CR	
R95	QRV143F-3571	MFR	
R96	" -4642	"	
R97	QVP9A0B-682	VR	
R98	QRV143F-4641	MFR	
R99	" -3481	"	
R100	QRD167J-224	CR	
R101	" -102	"	
R102	QVP9A0B-102	VR	
R103	QRD167J-562	CR	
R104	QRV143F-1003	MFR	
R105	" -1302	"	

Symbol No.	Part No.	Part Name	Description
R106	QVP9A0B-473	VR	
R107	QRV143F-9762	MFR	
R108	QVP9A0B-473	VR	
R109	QRV143F-9762	MFR	
R110	QRD167J-103	CR	
R111	" -153	"	
R112	" -103	"	
R113	" -123	"	
R114	" -103	"	
R115	" -472	"	
R116	" -223	"	
R117	" -474	"	
R118	" -184	"	
R119	" -102	"	
R120	" -474	"	
R121	" -683	"	
R122	" -103	"	
R123	" -103	"	
R124	-	-	
R125	-	-	
R126	QRV143F-2943	MFR	
R127	" -1473	"	
R128	" -2943	"	
R129	QRD167J-103	CR	
R130	" -103	"	
R131	" -103	"	
R132	" -182	"	
R133	" -330	"	
R134	" -821	"	
R135	" -183	"	
R136	" -562	"	
R137	" -222	"	
R138	" -470	"	
R139	" -821	"	
R140	" -103	"	
R141	" -332	"	
R142	" -103	"	
R143	" -181	"	
R144	" -104	"	
R145	" -270	"	
R146	" -181	"	
R147	" -102	"	
R148	-	-	
R149	-	-	
R150	-	-	
R151	QRD167J-331	CR	
R152	" -270	"	
R153	QRX029J-R82G	MFR	
R154	QRD167J-331	CR	
R155	" -473	"	
R156	" -103	"	
R157	" -103	"	
△ R158	PU52108-1R0	Posistor	
R159	QRD167J-103	CR	
R160	" -104	"	
R161	" -103	"	
R162	" -103	"	
R163	" -103	"	
R164	" -103	"	
R165	QRD161J-682	"	

Symbol No.	Part No.	Part Name	Description
C 1	QET41CM-476	E Cap	
C 2	QCS11HJ-151	C Cap	
C 3	" -220	"	
C 4	QEE41VM-474	T Cap	
C 5	QFM41HJ-683M	MY Cap	
C 6	QCF11HP-103	C Cap	
C 7	QET41CM-227	E Cap	
C 8	QFN41HK-103	MY Cap	
C 9	" -103	"	
C10	" -103	"	
C11	" -102	"	
C12	QFM41HJ-152M	"	
C13	QCS11HJ-561	C Cap	
C14	QET41HM-105	E Cap	
C15	" -105	"	
C16	QET41CM-227	"	
C17	QCF11HP-103	C Cap	
C18	QCS11HJ-471	"	
C19	QET41CM-227	E Cap	
C20	QCF11HP-103	C Cap	
C21	QET41CM-106	E Cap	
C22	QFN41HK-103	MY Cap	
C23	QCS11HJ-220	C Cap	
C24	QET41CM-227	E Cap	
C25	QCF11HP-103	C Cap	
C26	QCS11HJ-101	"	
C27	" -101	"	
C28	QET41CM-476	E Cap	
C29	QFN41HK-222	MY Cap	
C30	QCS11HJ-151	C Cap	
C31	" -220	"	
C32	QEE41VM-474	T Cap	
C33	QFM41HJ-393M	MY Cap	
C34	QCF11HP-103	C Cap	
C35	QET41CM-227	E Cap	
C36	QFN41HK-103	MY Cap	
C37	" -103	"	
C38	QFM41HJ-333M	"	
C39	QFN41HK-103	"	
C40	QET41HM-105	E Cap	
C41	" -105	"	
C42	QFN41HK-103	MY Cap	
C43	-	-	
C44	-	-	
C45	-	-	
C46	-	-	
C47	QFP42AF-102M	PP Cap	
C48	QFN41HK-332	MY Cap	
C49	QCS11HJ-331	C Cap	
C50	QCF11HP-103	"	
C51	QET41CM-227	E Cap	
C52	-	-	
C53	QFP42AF-682M	PP Cap	
C54	QET41CM-107	E Cap	
C55	QCF11HP-103	C Cap	
C56	QET41HM-105	E Cap	
C57	QFM41HJ-104M	MY Cap	
C58	QFN41HK-103	"	
C59	QET41HM-105	E Cap	
C60	" -105	"	
C61	QFM41HJ-393M	MY Cap	
C62	" -393M	"	
C63	" -103M	"	
C64	QCS11HJ-330	C Cap	
C65	QFP42AF-273M	PP Cap	

Symbol No.	Part No.	Part Name	Description
C66	QFM41HJ-223M	MY Cap	
C67	QET41CM-227	E Cap	
C68	QCF11HP-103	C Cap	
C69	QFN41HK-104	MY Cap	
C70	QCF11HP-103	C Cap	
C71	QET41CM-337	E Cap	
C72	QFP42AF-103M	PP Cap	
C73	QFM41HJ-103M	MY Cap	
C74	QFP42AF-183M	PP Cap	
C75	QCF11HP-223	C Cap	
C76	" -103	"	
C77	QET41CM-227	E Cap	
C78	QEE41CM-106	T Cap	
C79	" -106	"	
C80	QFN41HK-124	MY Cap	
C81	QEE41CM-106	T Cap	
C82	QFP42AF-183M	PP Cap	
C83	" -183M	"	
C84	" -363M	"	
C85	QET41CM-227	E Cap	
C86	QCF11HP-103	C Cap	
C87	QET41HM-105	E Cap	
C88	QET41EM-475	"	
C89	QET41HM-105	"	
C90	QET41EM-475	"	
C91	QET41HM-105	"	
C92	QFN41HK-223	MY Cap	
C93	QEN41EM-475	NP Cap	
C94	QFN41HK-102	MY Cap	
C95	QET41HM-225	E Cap	
C96	QEN41EM-475	NP Cap	
C97	QET41EM-476	E Cap	
C98	QCF11HP-103	C Cap	
C99	QFN41HK-104	MY Cap	
C100	QCS11HJ-101	C Cap	
L 1	PU48530-271K	Peaking Coil	
L 2	" -271K	"	
L 3	" -271K	"	
L 4	" -271K	"	
L 5	-	-	
L 6	PU48530-271K	Peaking Coil	
L 7	PU30284-51R	Choke Coil	
L 8	PU48530-221K	Peaking Coil	
L 9	" -271K	"	
L10	" -271K	"	
L11	" -271K	"	
S 1	PU49847	Slide Switch	
X 1	PU47931-2	Crystal	
CN 7	PU50715-17	Female Conn.	
CN 8	" -14	"	
CN 9	" -14	"	

Symbol No.	Part No.	Part Name	Description
	PU32908 GBST3006Z	Servo PWB Stay Th. Tap. Screw	
	PU45908	Test Pin	TP1
	PU50766	"	TP3-30
	PU45908	"	TP31-35

6.2.17 Motor Circuit Board Ass'y [2] [3] PGE20013A

Symbol No.	Part No.	Part Name	Description
CN 1	PU50714-6	Female Conn.	
CN 2	" -18	"	
CN 3	" -16	"	
CN 4	" -18	"	
CN 5	" -18	"	
CN 6	" -6	"	
CN 7	" -17	Male Conn.	
CN 8	" -14	Female Conn.	
CN 9	" -14	"	
CN10	-	-	
CN11	-	-	
CN12	-	-	
CN13	-	-	
CN14	-	-	
CN15	PU43351-9	Cap. Housing	
CN16	-	-	
CN17	PU43351-2	Cap. Housing	
CN18	" -2R	"	
CN19	" -3	"	
CN20	" -3Y	"	
CN21	" -5	"	
CN22	" -5R	"	
CN23	" -5	"	
CN24	" -4	"	
CN25	" -2	"	
CN26	" -2R	"	
CN27	" -3Y	"	
CN28	" -3	"	
CN29	" -2	"	
CN30	" -2Y	"	
PU32910	Mother PWB Stay		
PU33641	PWB Guide		
GBST3008Z	Tapping Screw		
SDSA3008Z	Screw		
PU47876	PWB Holder		

6.2.18 Search VR Board [2] [4]

Symbol No.	Part No.	Part Name	Description
⚠	PGE40004-1-2	Circuit Board	
R 1	PGZ00001-2	Search VR	
R 2	QVZ3531-472	VR	
CN 1	PU43351-6	Cap. Housing	

6.2.19 Switch Board [2] [6]

Symbol No.	Part No.	Part Name	Description
⚠	PGE20014-1-1	Circuit Board	
S 1	PGZ00016-001-1	Slide Switch	
S 2	"	"	
S 3	PGZ00017-001-1	"	
S 4	PGZ00016-001-1	"	
S 5	"	"	
S 6	"	"	
S 7	"	"	
S 8	QSS2301-007	"	
S 9	PGZ00016-001-1	"	
S10	PGZ00017-001-1	"	
S11	"	"	
S12	PGZ00016-001-1	"	
CN 4	PU43351-104	Cap. Housing	
CN 5	" -104	"	

6.2.20 VR Board [2] [7]

Symbol No.	Part No.	Part Name	Description
⚠	PGE30004	Circuit Board	
R 1	QRD187J-391	CR	
R 2	QRX129J-100M	MFR	
R 3	PGZ00023-002	VR	
R 4	" -003	"	
R 5	" -001	"	
R 6	" -001	"	
R 7	" -005	"	
CN 3	PU43351-104	Cap. Housing	
CN 4	" -104	"	
CN 5	" -104	"	

6.2.21 Display Circuit Board Ass'y [3] [2] PGE30003A2-1

Symbol No.	Part No.	Part Name	Description
S 1	PU50660-2	F.D.P.	
S 2	PGZ00029	Push Switch	
	"	"	
	PU50515	Display Holder	
	SDSA2608Z	Screw	

6.2.22 Warning & NR LED Board [3] [6]

Symbol No.	Part No.	Part Name	Description
⚠	PGE40010-1-1	Circuit Board	
D 1	GL-9NG2	L.E.D.	
D 2	GL-9PR2	"	
R 1	QRD167J-102	CR	
R 2	" -102	"	

6.2.23 Pick Out Det. Board [3] [8]

Symbol No.	Part No.	Part Name	Description
⚠	PGE40012	Circuit Board	
	PU50576	PH. Interrupter	
	SPSP3006Z	Screw	

6.2.24 Hour Meter Board [4] [0]

Symbol No.	Part No.	Part Name	Description
⚠	PGE40013-1-1	Circuit Board	
R 1	QRD167J-183	CR	
R 2	" -392	"	
R 3	" -274	"	
	PU44398	Fuse Socket	
	PU44629	Hour Meter	

6.2.25 Power Transistor Board [4] [1]

Symbol No.	Part No.	Part Name	Description
⚠	PGE40014-1-1	Circuit Board	
R 1	QRD167J-222	CR	
C 1	QET41CM-337	E Cap	

6.2.26 Video Erase Circuit Board Ass'y [4] [2] PGE20015A

Symbol No.	Part No.	Part Name	Description
IC 1	TC4538BP	Integrated Circuit	
IC 2	"	"	
Q 1	2SC2647C	Transistor	
Q 2	"	"	
Q 3	2SC2021R	"	
Q 4	-	"	
Q 5	2SC2647C	Transistor	
Q 6	2SD638R	"	
Q 7	2SB643R	"	
Q 8	2SC2021R	"	
Q 9	2SC2647C	"	
Q10	2SD638R	"	
Q11	2SB643R	"	
Q12	-	"	
Q13	2SC2647C	Transistor	
Q14	2SB643R	"	
Q15	"	"	
Q16	2SC2021R	"	
D 1	1SS133	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
R 1	QRD167J-103	CR	
R 2	" -273	"	
R 3	" -101	"	
R 4	" -272	"	
R 5	" -681	"	
R 6	" -392	"	
R 7	QVP4A0B-103	VR	
R 8	" -103	"	
R 9	QRD167J-102	CR	
R10	" -103	"	
R11	" -332	"	
R12	" -561	"	
R13	" -101	"	
R14	" -4R7	"	
R15	" -4R7	"	
R16	" -103	"	

Symbol No.	Part No.	Part Name	Description
R17	QRD167J-332	CR	
R18	" -561	"	
R19	" -101	"	
R20	" -4R7	"	
R21	" -4R7	"	
R22	-	-	
R23	-	-	
R24	QRD167J-124	CR	
R25	" -103	"	
R26	" -103	"	
R27	" -682	"	
R28	" -104	"	
R29	" -222	"	
R30	" -104	"	
R31	" -222	"	
R32	" -102	"	
R33	" -104	"	
R34	" -103	"	
R35	" -333	"	
R36	QRV143F-1153	MFR	
R37	QVP4A0B-333	VR	
R38	QRV143F-1503	MFR	
R39	QVP4A0B-333	VR	
R40	QRD167J-103	CR	
R41	QRV143F-1153	MFR	
R42	QVP4A0B-333	VR	
R43	QRV143F-1503	MFR	
R44	-	-	
R45	QVP4A0B-333	VR	
R46	QRD167J-103	CR	
R47	-	-	
R48	-	-	
R49	QRD167J-333	CR	
C 1	QCS11HJ-100	C Cap	
C 2	" -121	"	
C 3	" -121	"	
C 4	" -820	"	
C 5	QFN41HK-103	MY Cap	
C 6	QCF11HP-103	C Cap	
C 7	QET41EM-107	E Cap	
C 8	QFN41HK-103	MY Cap	
C 9	" -473	"	
C10	QFN41HJ-103	C Cap	
C11	QCF11HP-103	E Cap	
C12	QET41EM-107	MY Cap	
C13	QFN41HK-103	"	
C14	" -473	"	
C15	QFN41HJ-103	C Cap	
C16	QCF11HP-103	E Cap	
C17	QET41EM-107	MY Cap	
C18	" -476	"	
C19	QCF11HP-103	C Cap	
C20	QFN41HJ-823	MY Cap	
C21	-	-	

Symbol No.	Part No.	Part Name	Description
C22	QFN41HJ-104	MY Cap	
C23	-	MY Cap	
C24	QFN41HJ-823	MY Cap	
C25	" -104	"	
L 1	PU48530-471K	Peaking Coil	
L 2	PU53618-220F	"	
L 3	PU48530-471K	"	
L 4	" -471K	"	
L 5	" -471K	"	
⚠ CP 1	ICP-N10	IC Protector	
X 1	PGZ00024	Crystal	
CN 1	PU43351-3	Cap. Housing	
CN 2	" -2R	"	
CN 3	" -3	"	
	PU45908-2	Test Pin	TP1-5

6.2.27 Line Filter Board 4 3

Symbol No.	Part No.	Part Name	Description
▲	PGE40020-1-1	Circuit Board	
▲	PU48680	Line Filter	
▲ C 1	QFH72BM-103	MM Cap	

